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THE INNER RING

The Early History of
the National Research Council of Canada

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The Early History of the National Research Council of Canada

By MEL THISTLE

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TO E. W. R. STEACIE

President
National Research Council of Canada
1 April 1952 to 28 August 1962

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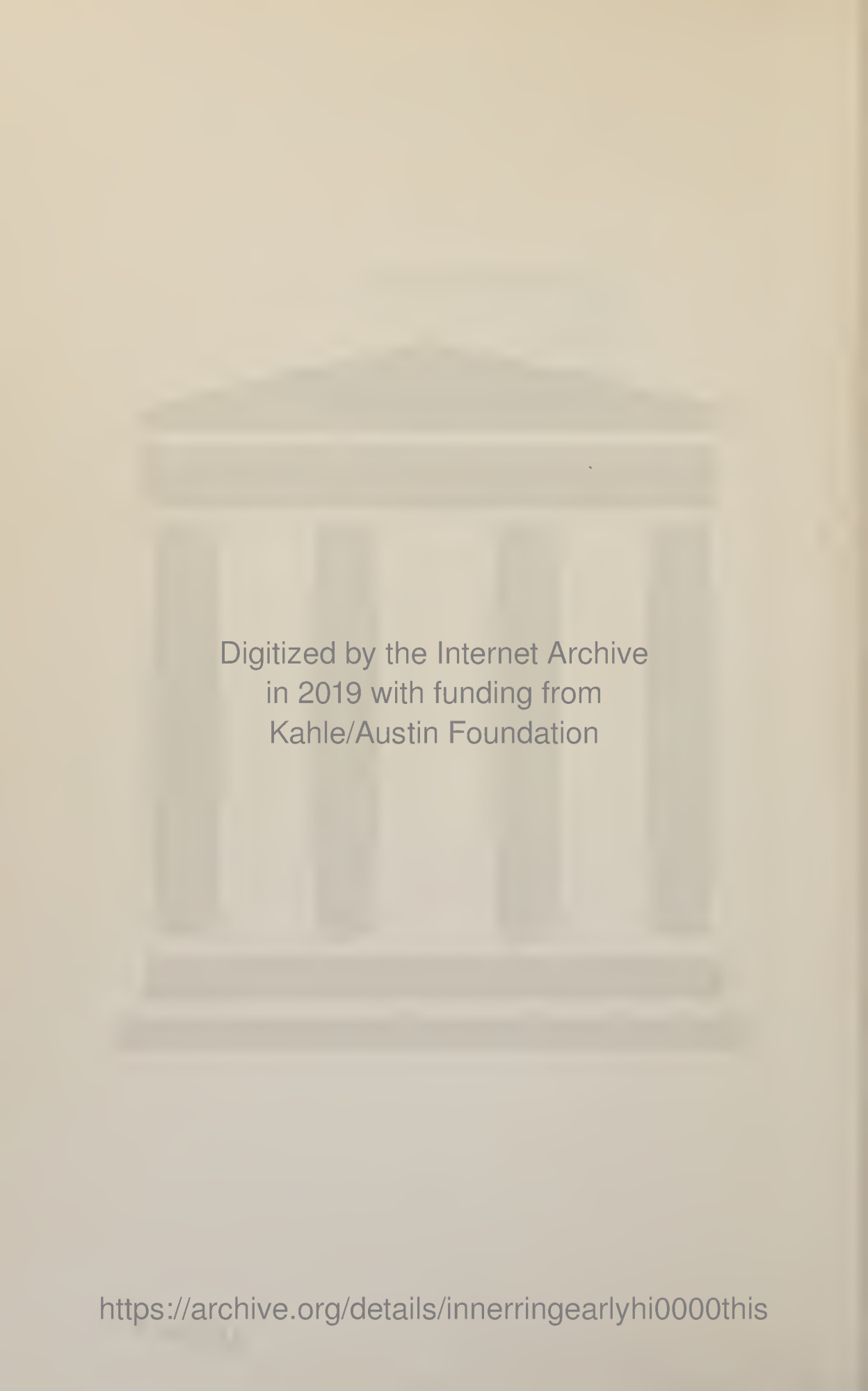
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"With characters big enough,
one ought not to be polite."—Sir Henry Tizard

"There were giants in the earth
in those days."—Genesis, VI, 4

"This expansion of Governmental provision,
this development of the political interest in the scientific,
has rested upon the clear demonstration that a nation's
power to prosper in peace, survive in war, and command
the respect of its neighbours, depends very largely
on its degree of scientific and technological advance.
"These considerations are fairly obvious and need no
emphasis."—Viscount Hailsham, 1963

Preface

I WROTE this book at the request of Dr. E. W. R. Steacie, late President of the National Research Council of Canada. It deals with the early history of the Council, from its beginning in 1916 to about 1935. This ancient period bristles with thundering prophets, who tilted with what might be called the "higher apathy" and who always struggled with ignorance, both in themselves and in other people. The ancient and modern periods are different: these days the enemy is not apathy, but rather an increasing interest in science, although the ignorance remains. It is debatable whether science will suffer more from modern interest and support—coupled with an appalling ignorance—than it has ever suffered from the earlier indifference and neglect. However, the early apathy hurt and burned, and produced just as vigorous reactions as the modern clumsy interest and puzzled interference are producing.

In some ways, the early period is even more fascinating than the modern period. Much of the acrimonious debate in the teens and twenties could carry a modern date-line without arousing the faintest suspicion that this is, in fact, ancient history. Big men do not often quarrel over trifles of the moment; their main concern is for the future. However, one cannot help but remember, with discomfort, the saying of Santayana that those who cannot remember the past are condemned to repeat it.

For almost the entire reach of this history, ending in 1935, the National Research Council had no laboratories of its own, and in fact its budget never rose above half a million dollars. It was almost entirely an advisory and coordinating body, with some of the functions of a scientific foundation. Not until the early thirties is there a hint of the complex and lovely thing that NRC was destined to become.

The basic theme of this book is the long and bitter struggle to establish these central laboratories. Canada already had reasonable facilities to serve the primary industries of agriculture, mining, fishing, forestry; the need was mainly to provide for those secondary

and manufacturing industries that had begun to emerge. Neither the young industries themselves nor the universities could hope to do it; this left government as the only possible progenitor.

In retrospect, the struggle to achieve laboratories for industrial research took place in a unique arena, arranged in four concentric circles. In the inner ring were the members of the National Advisory Council on Scientific and Industrial Research (otherwise known as the National Research Council), a lively body fully united about what needed to be done, but often divided into clashing groups on how to go about it.

The next circle, without whom nothing could be achieved, was composed of cabinet ministers—members of the Privy Council Committee on Scientific and Industrial Research, under the chairmanship of the Minister of Trade and Commerce. Officially they were supposed to weigh and judge the advice received from the Advisory Council, but in practice their more basic problem was to gather enough respect for scientists to be able to listen to what the scientists were saying.

The next circle was made up of groups of technical civil servants who saw the NRC as a potent threat to their job security, and who owed tribal allegiance to their deputy ministers.

The outer ring was composed of industrial groups, universities, and provincial governments, shading off into the public at large.

This is, of course, an over-simplified and static model. The struggling within and between rings went on simultaneously; the central group was recruited from the outer rings; and many other factors help to blur the outlines. Nevertheless, this "ring" structure is used throughout the book, somewhat in the fashion of a kaleidoscope: for each year, it functions to convert the coloured chaos of chronology into some semblance of pattern. This pattern resolves in terms of action and reaction, of struggle, of conflicts in ideas and attitudes.

I have endeavoured to present these rings largely by a selection of letters and passages to indicate the extreme diversity of problems facing the Council, the steady background of devoted duty on committees, the long hours spent in choosing between contenders for scholarships and grants. I have given a full measure of space to the major achievements, such as NRC's part in the campaigns against

wheat rust, deterioration of concrete in alkali soils, and effects of smelter fumes on vegetation. I have made much of many scores of more acute achievements, such as solving the canned lobster difficulty, the magnesite problems, and so forth. I have not concealed the Council's efforts in fields that did not come up to original expectations, such as the work on lignite and peat. So far as space is concerned, I have done my best to play fair.

This method of presentation—selected passages from surviving letters—has a number of built-in flaws. It makes the leaders seem more important and more dictatorial than they in fact were, and it makes the "ordinary" member of Council seem rather mere, which simply is not true. The Council was about as good a working democracy as one will ever find in a group loaded with academics. But since it is the leader's letters that survive, this fact in itself serves as a magnifying glass, focused on *his* words.

A more serious disadvantage is that while what the leader says may be true, in a large sense, he is seldom a man of detail. The great bulk of actual scientific activity seems to be diminished and the small and brief personal differences seem to be magnified. Hence, six months of useful thrumming activity will be obliterated by one glorious fight that lasts forty seconds. Now this is not fair, but the impression tends to be established if you use this particular method of reporting, during a period when emotions are likely to be involved.

Then why use it?

Because selected passages of letters also have certain advantages. As Pooh-Bah says in *The Mikado*, they "lend an air of authenticity to an otherwise bald and unconvincing narrative." They act as a slice through time itself and, if the choice is managed with sufficient care, the immediacy of that actual ancient moment is transmitted undamaged into the later "now." It seemed to me that the advantages outweighed the defects, and it was on this assumption that I proceeded.

"King John," said A. A. Milne, "has his little ways." Now this is a true observation. I have seldom met a scientist in whom it was not possible to discern some interesting little way or other, and I doubt if he has ever failed to return the compliment.

Knowing this, I was struck by the disparity between the usual "public image" of a scientific hero and the man himself. On the one

hand, metal-hard biography in which only virtues are mentioned, a stiff and glittering statue, solid gold clear through; on the other, a warm human being with interests and passions and a variegated assortment of little ways. Gradually I discerned a monstrous and widespread libel, that scientists are somehow less human than men in other callings, whereas I know from living among them that most of the evidence is in the opposite direction.

Now, what really happens when a new institution is created? It seems to me that existing institutions of the nearest patterns feel themselves jostled. Specific toes are trodden upon and there are cries of pain and anger.

It has to be recognized that men with their little ways become interested in a large new enterprise for various reasons, but partly because it may advance their own occupations and make their own interests more meaningful. Of course the "motive" is far more complex than that: at both higher and lower levels it includes devotion to the welfare of humanity, to intellectual development, to the state of the art or science, to a specialty such as low temperature physics, to the new institution being born, to the old institution that one happens to represent, and to the national economy, as well as the personal necessity to become more important, the need to make a living, and so forth. My task in telling the story of this institution was to avoid choosing between the more noble and the more personal elements, but rather to be as accurate as possible.

A scientific institution, like any human enterprise, ought to be founded by whole men. Were the men who founded the NRC inclined to be either self-seeking bores or wispy idealists? Did they possess enough strong interests in the field of science to know what they were talking about? Were they prepared to advance those interests in the face of determined opposition?

To obtain an answer to such questions, many of the documents that were meant to be read—minutes of the last meeting and so forth—were not worth reading, except as a cross-check on topics. Documents that were *not* meant to be widely read—such as personal correspondence—were of rather more value. The "open" documents tended to reduce or to elevate everything to the middle, or mediocre motive of serving the national interest. This range is narrow. Private correspondence, on the other hand, was equally revealing of the

highest spiritual aspirations, and aims that were intensely personal. This wider range tends to be both more accurate and more interesting than the standardized open literature; it reminds one of the surprising range of flavours in "real" cheeses as opposed to the bland dependability of processed cheese. I have therefore leaned heavily on private letters, among which I had a better chance to find informative summaries of what was going on, and an occasional spark of humour.

When a staff member undertakes to write a history of his own institution, he must face the impossibility of being completely objective in the ideal sense. The built-in need to think well of his tribe has to be taken into the reckoning. Do what he will, the work will resemble a painting rather than a photograph; and even a reasonably accurate painting tends to stay put, while the institution continues to change. But the effort to be as objective as possible must be exerted: as Francis Bacon said, we must try to reach, not what we have wanted to find, but whatever truth has to tell us.

The men who founded and nurtured the National Research Council of Canada were whole men, filled with a steady purpose; also with lively passions and frequently a sense of fun. The sharp creative note of discord sounded often. Although they were as avid for the Grail as any knight in Camelot, it was not entirely a dedicated search for truth in either of these kingdoms.

There were times when H. M. Tory seemed to think that his initials stood for "His Majesty." He laid about him with a verbal weapon that made up in vigour what it may have lacked in finesse—a battle-axe rather than a rapier. And in this acerbity he was not by any means alone—before, after, or during his period of service.

Some of these Canadians were dotted with faults like cloves in a ham. This did not prevent them from doing a splendid job. In what follows, I have tried neither to seek nor to avoid the evidence of discord, but rather to preserve something of the flavour of cloves that clung so delightfully throughout this pleasant task.

Acknowledgments

MY FIRST ACKNOWLEDGMENT, by any method of selection, must go to Dr. E. W. R. Steacie, late President of the National Research Council of Canada, without whom (quite literally) this work would not have been undertaken.

Similar consideration and encouragement were extended to me by his successor in the office of President, Dr. B. G. Ballard, to whom I am beholden for great kindness, deep understanding, and much patience, as well as many details about NRC in the nineteen-thirties.

It is hard to express my indebtedness to Dr. J. Bruce Marshall for his invaluable aid in locating the main bulk of my sources—about a cubic yard of private documents and letters, lost and neglected in battered cardboard cartons for many years. Only the fact that they *were* lost preserved them from the terrifying efficiency of war-time administrators, who succeeded in destroying practically all of the ancient files that might have been helpful.

I had the good fortune to be closely associated with Dr. Frank Underhill, one of Canada's great humanists, during most of my work-period. He opened doors for me in worlds of scholarship outside the laboratory, as well as making many germinal suggestions about the manuscript. I was also greatly helped by Professor Wilfrid Eggleston, Head of the Department of Journalism at Carleton University.

Within the scientific community, I had frequent and easy access to the wisdom of a grey eminence named Dr. Chalmers Jack Mackenzie, who invariably found occasions for ruthless correction, and could prove it—a warm and genial form of beneficent surgery with a value that cannot be computed.

I consulted the first Secretary of the NRC, Dr. J. B. Challies, and spent many hours with Mr. S. Preston Eagleson, who succeeded him.

Scientists consulted include General A. G. L. MacNaughton, Dr. C. J. Mackenzie, Dr. E. W. R. Steacie, Dr. B. G. Ballard, Mr. J. H. Parkin, Dr. W. H. Cook, Mr. Frank E. Lathe, Dr. Léo Marion, and Dr. D. C. Rose.

I am indebted to Miss E. P. Wheaton, Mr. Harry Williamson, Mr. G. T. McColm, Dr. John R. Kohr, and Mr. Robert E. M. Anderson for valuable comments as the work progressed.

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The Journals Branch of the House of Commons made available to me certain letters tabled in 1935, which could not be found elsewhere.

Fortunately for me, the Department of Trade and Commerce was having a departmental history prepared concurrently with my own work. Not only did the Department give me free use of their documents; they also gave me access to their historians and assistants. I am therefore happy to record my gratitude not only to the Department, but also to Professor D. F. Forster, Department of Political Economy, University of Toronto, and to Professor M. H. Watkins of the same university, for the most practical kind of help; and to Mr. K. L. Wyman, research assistant on the Trade and Commerce project in 1962–63, who provided me with virtually all of the material based on the Foster Papers, the Meighen Papers, and the files of the Department of Trade and Commerce. This material underlies the bulk of the first chapter, called "Beginnings," and parts of the chapters dealing with events during 1920 and 1921.

Finally, I gratefully record my indebtedness to various officials of the University of Toronto Press, but in particular to Miss Francess Halpenny, who is as gracious and efficient an editor as I have ever encountered.

M.W.T.

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THE INNER RING

The Early History of
the National Research Council of Canada

Beginnings

"An Idea isn't responsible for the people who believe in it."—Don Marquis

"It is provided in the essence of things, that from any fruition of success, no matter what, shall come forth something to make a greater struggle necessary."—Walt Whitman

IN MARCH 1917, Dr. A. B. Macallum, first Chairman of the National Research Council, told a meeting of the Empire Club in Toronto:

The Canadian Research Council was not called into existence too soon or too late. In the world crisis of today Canada has, industrially, a specially-favoured position. We were, at the beginning of it, not wholly thrown on our own resources, industrial and natural, as Great Britain and Australia were. They found themselves at once cut off from the sources of their supplies in raw materials on certain lines, and they were quite unprepared to undertake the manufacture of products of a vitally essential character which they had previously imported from abroad, chiefly from countries now at war with them. They had to act, but they did not do so at once. The British Council was formed eleven months after the war began. The Australian Council came into existence seven months later still. We in Canada did not feel the urgency of action in this matter because we are side by side with a nation of one hundred million people, with resources largely developed, which so far has supplied us in very large part with what we formerly imported from Europe and at prices which, though considerably enhanced, were not prohibitive. The urgency that existed in Great Britain and Australia, therefore, did not obtain with us, and consequently Sir George Foster, who had charge of the matter, took the position, which I think was wholly correct, that before creating a Canadian Research Council the

results of the experience gained elsewhere should be carefully studied and the conclusions drawn therefrom wisely applied in our case. (1)

Canada established a Sub-Committee of the Privy Council on Scientific and Industrial Research by an Order in Council dated June 6, 1916; with provision for an Advisory Council, modelled after the British example. The members of its Advisory Council for Scientific and Industrial Research were named by an Order in Council dated November 29, 1916 (2). This advisory group became better known under its short title of "National Research Council."

As early as the beginning of 1915, however, several Canadian industrialists, smarting from the economic effects of the war, had urged the Canadian government to encourage industrial research. Mr. A. T. Drummond, President of Canada Sugar Refining Co. Ltd., suggested that the government should cooperate with the universities to improve and extend manufactures (3). He extended his ideas to definite numbers and kinds of experts for each university, plus fellowships (4), and explored this proposal with Principal W. Peterson of McGill University and President R. A. Falconer of the University of Toronto, who cordially approved and who agreed that Queen's University should be included (5). Drummond finished his rapid series of prodding letters as follows: "The universities named would require to be further consulted, but my own personal impression is that even if only one department were aided in each of these three universities, an annual amount of $6500 at each of them would provide an effective start for an expert, an assistant, a post graduate fellowship and an allowance for material and equipment" (6).

During the same two months, January and February of 1915, Mr. T. H. Wardleworth, President of National Drug and Chemical Company, also sent enquiries to the Minister of Trade and Commerce, Sir George Foster. Wardleworth, acting on behalf of the Society of Chemical Research, suggested that the universities might do a considerable amount of valuable research if the government provided financial assistance (7).

These and other suggestions resulted in a meeting, held in Sir George Foster's office on May 25, 1915. Present, at the invitation of Sir George, were the following representatives of universities and industries:

F. D. Adams, Dean of the Faculty of Applied Science, McGill University
Frank Arnoldi, President, Royal Canadian Institute
H. T. Barnes, Director of Physics, McGill University
G. T. Chown, Registrar, Queen's University
W. E. Ellis, Dean of the Faculty of Applied Science, University of Toronto
R. A. Falconer, President, University of Toronto
W. L. Goodwin, Dean of the Faculty of Practical Science, Queen's University
H. M. MacKay, Professor of Civil Engineering, McGill University
J. C. McLennan, Professor of Physics, University of Toronto
W. Peterson, Principal of McGill University
R. F. Ruttan, Director of Chemistry, McGill University
T. H. Wardleworth, President, National Drug and Chemical Company

Sir George Foster was chairman of this conference. Chown and Wardleworth acted as representatives of the Canadian Manufacturers' Association (8).

This conference discussed a memorandum (9), prepared in advance by the government, which contemplated establishing a Commission on Industrial Research, to consist of nine members and a paid secretary. The proposed commission would allocate funds for university research in subjects of national significance such as paper, metallurgy, dyestuffs, cement; for research on behalf of individual manufacturers; and for scientific research.

However, the conference did not result in any immediate commitment from the government. Instead, Foster asked his Commissioner of Commerce, Richard Grigg, to find out what research was going on in government departments, either independently or through the universities (10). Six months later, Grigg was able to submit a memorandum to Foster (11) estimating that total expenditures on university research by government departments, from 1912 to 1915, amounted to $277,000. According to Grigg, the situation was not altogether satisfactory, and further research should be carried on at Ottawa: "Dr. Haanel points out that very delicate and costly instruments paid for by the Mines Branch were returned from Queen's University in very bad condition and were almost ruined. He is therefore of the opinion that such instruments should not be provided for any university and that experiments should be conducted in Ottawa" (12). Meanwhile, Foster continued to receive letters

from interested industrialists and university representatives urging immediate establishment of the Commission on Industrial Research. On July 31, 1915, Foster replied to T. H. Wardleworth: "The dispersing of the Cabinet Ministers and press of other work has prevented my taking any further steps with regard to the proposed Commission" (13). Foster promised to take up the matter as quickly as possible. Several months later, Wardleworth again urged Foster to establish the commission (14). Foster made a similar promise as before (15). On November 24, 1915, A. T. Drummond added his voice to the chorus, citing a recent article in the *Monetary Times* to show what the universities had already accomplished in an unaided way (16). Foster replied that he hadn't lost sight of the matter, but the pressure of war-work had made an active follow-up of the conference impossible (17).

Months elapsed before Foster found time to follow up the conference, and then it was the British government which provided the final stimulus. After a Research Council was created in the United Kingdom on July 28, 1915, suggestions were made from various sources that it should be extended and made applicable to the Overseas Dominions. Moreover, on January 28, 1916, the Ministry of Munitions sent to certain Canadian as well as United Kingdom universities a circular inviting cooperation in the improvement and invention of appliances for land warfare. The circular requested that some department of the Canadian government coordinate university research activities (18). On May 1, 1916, William Peterson, Principal of McGill University, told Foster that he proposed to place before the annual conference of Canadian university presidents a motion that the universities associate themselves with the United Kingdom Research Council. Peterson added the proviso that he would do this unless Foster had more to report in regard to cooperation between the Dominion government and Canadian universities (19). On May 5, 1916, Foster answered: "I have not yet abandoned my idea of cooperative work with the Universities along the line of research. . . . The scheme of the Imperial authorities is wide and comprehensive, but it seems to me that first and foremost each Dominion should organize itself and through that organization, work with the Imperial scheme" (20).

In the next few weeks, Foster consulted with Wardleworth and Drummond, and with Professor J. C. McLennan (Department of

Physics, University of Toronto), who was vice-president of the Royal Canadian Institute, a private organization that promoted scientific research and who acted as liaison between industry and the universities. On May 23, 1916, shortly before leaving for England, Foster submitted a recommendation to the Privy Council, asking for the appointment of a Committee of the Privy Council to consist of the Minister of Trade and Commerce, the Minister of the Interior, the Minister of Mines, plus the Ministers of Inland Revenue, Agriculture, and Labour, to be responsible for the expenditure of any moneys provided by parliament for scientific and industrial research (21). He also recommended the establishment of an Honorary Advisory Council, to be responsible to the Committee of the Privy Council, and to be composed of nine members representing the scientific and industrial interests of Canada. Foster argued strongly the need for an Honorary Advisory Council to coordinate research in the universities and to suggest projects for them. The urgent need was to organize existing resources of industrial and scientific research in Canada in order to utilize waste products, to discover new processes—mechanical, chemical, and metallurgical—and to develop the unused natural resources of the country. Foster added:

> At no period has the importance of such united and thorough action been so evident as since the conditions brought about by the war, when the scarcity of certain compounds and processes has caused confusion and paralysis in industries and greatly added to costs of living. Canada has educational and scientific institutions more or less well equipped for conducting this research, which have already done much along their several lines and are willing and anxious to equip themselves for doing more. There are also private, corporate and Government laboratories, more or less engaged in research work. The Manufacturers' Association are alive to the importance and absolute necessity of such work in relation to the industries of the country. (22)

On May 26, 1916, Foster wrote to J. C. McLennan:

> In the line of my conversation with you, I have made a recommendation to my colleagues following out mainly the ideas developed at our conferences, which I detailed somewhat to you. I was very anxious to get this matter through before I left, so as to get the Advisory Council into being and mapping out its work, but I find this will have to be deferred in the main part until my return. I am writing you chiefly in respect to

the composition of the Advisory Council. My idea is to have seven or nine on the Board, and to have two of these representatives of the industrial interests—and five scientific men, men versed in industrial research work—We want men of science, of course, but we also want men of a practical turn who have business in them. (23)

The day before, Foster recorded in his diary: "Submitted my Research plan favourably received and awaits the return of the Prime Minister. I fear it will be hung up" (24). The Research plan was approved by Order in Council on June 6th (21). The Advisory Council was to report from time to time to the Minister of Trade and Commerce as chairman of the subcommittee of cabinet. The composition of the Research Council was left up in the air, but Trade and Commerce was to pay the salary of its full-time secretary, and the travelling expenses of its members.

The Canadian government was thus committed to additional, if limited, encouragement for scientific and industrial research. But several voices were heard to demand a more far-reaching and far-sighted scheme of government support. On June 5, 1916, Sir Robert Borden, Prime Minister, wrote to Sir George Foster:

Sir Clifford Sifton spoke to me some time ago and expressed the apprehension that too much reliance would be placed upon the work of the Universities. He considers that research of a thoroughly important character cannot be performed by men who are devoting the chief part of their time, ability and energies to other duties as lecturers or instructors, etc. It is his opinion that research work should be conducted upon a national scale and in institutions established and maintained by the Government. He admits that the cost would be great as the best experts in the world would have to be engaged; but on the other hand he considers that there is no use in doing the work on a small scale or in an inefficient manner. (25)

Towards the end of May, the Canadian Society of Civil Engineers urged Borden to create government laboratories at Ottawa for testing processes before they were employed on a large scale in industry. Sir Joseph Flavelle favoured this idea (26). On June 3, 1916, the President of the University of Toronto, Robert Falconer, wrote to Flavelle:

In the University of Toronto we have a committee under the Presidency of Dean Ellis which is preparing a report on the question of the way in which a grant of funds could be advantageously used for the promotion

of the application of science to industry. . . . There seem to be two distinct proposals from the Ottawa side of it. One in accordance with Sir George Foster's Plan, an Advisory Committee to which all proposed plans for the carrying on of this object shall be submitted. The other a definite proposal for the establishment of laboratories at Ottawa, the Engineers, as in your memorandum, desiring laboratories for the practical testing of operations before they are carried into effect on a large scale by the government or manufacturers, and the proposal for the establishment of a Bureau of Standards.

There is another side to this question, and that is the extent to which a properly organized movement might make use of the laboratories that already exist in the University. It would seem to me, therefore, that the problems should not be approached from any one side, but that the Dominion should appoint a large and representative committee to deal with all these questions and if necessary to co-operate with the Provincial Governments and Provincial Universities. (27)

Perhaps because of possible objections from the universities and the provinces, perhaps because of the cost involved, no action was taken by the Borden government to create government laboratories at Ottawa. Indeed, even the Order in Council to establish an Advisory Research Council remained dormant for several months. In June and July, the Minister of Trade and Commerce was abroad, and in the fall of 1916 he travelled across western Canada with the Royal Commission on Imperial Trade, which had resumed its hearings.

When he returned from the hearings, Foster finally selected the members of the Advisory Research Council. By an Order in Council of November 29, 1916, the following were chosen (28):

Dr. Frank Adams, Dean of Applied Science, McGill University
Mr. T. Bienvenu, Vice-President and General Manager, La Banque Provinciale du Canada
Mr. R. Hobson, President, Steel Company of Canada
Dr. A. B. Macallum, Professor of Biochemistry, University of Toronto
Dr. A. S. Mackenzie, President, Dalhousie University
Dr. J. C. McLennan, Professor of Physics, University of Toronto
Dr. W. C. Murray, President, University of Saskatchewan
Mr. R. A. Ross, Consulting Engineer, Montreal
Dr. R. F. Ruttan, Professor of Chemistry, McGill University

Foster recorded in his diary: "[Privy] Council discusses only

trivialities. Got my Advisory Council though most members of [Privy] Council utterly indifferent or antagonistic" (29).

J. B. Challies of the Waterpower Branch in the Department of the Interior became the secretary of the Advisory Council. A. B. Macallum was appointed the full-time chairman, with headquarters in Ottawa, at a salary of $10,000 per annum. This was a larger salary than that of the Minister of Trade and Commerce. Other members of the Advisory Council received only a travel allowance of 10 dollars per diem while on Council business.

For the fiscal year 1916–17, the expenses of the Advisory Council were paid from the parliamentary vote for "extension and development of Canadian trade," which vote also covered expenditures for making motion pictures, for organizing an enemy sample exhibit, and for the toy fair (30). All items included in the vote for "extension and development of Canadian trade" were the result of wartime conditions, and their prime purpose was to encourage domestic production as a substitute for imports. While these expenditures were supervised, for the most part, by the Commercial Intelligence Branch, the Advisory Research Council reported directly to the Minister of Trade and Commerce, but only in his capacity as chairman of a special cabinet committee on scientific and industrial research.

Sir Robert Borden asked J. B. Challies to be secretary to the Research Council, without giving up his position as superintendent of the Dominion Water Power Branch. This arrangement was intended to ensure a liaison with departmental officialdom. However, Borden confided to Challies that he would put the vote for the Research Council through in such a way that the Auditor General would permit the vote to be controlled by the NRC itself (31). He did not wish the scientists to know this in the initial stages or "they will run riot."

Borden's attitude towards "the scientists" seems to have been rather like that of a wise father towards a group of talented but difficult adolescents. He knew that freedom was necessary, but he wanted to keep this heady information (about their own latch-key) away from them for a little while longer.

It did not last. At their very first meeting, held on December 4–6, 1916, in a room of the Department of Trade and Commerce, the

NRC agreed with implacable unanimity that the vote should be under their own complete control. At this point, T. Bienvenu, Vice-President of La Banque Provinciale du Canada, phoned his friend the Auditor General and discovered that a cheque signed by the Research Council's Chairman and Secretary would in fact be honoured: the first of all essentials had already been provided (31). This was Bienvenu's only contribution to the Council; after this meeting he never appeared again.

According to hearsay (31), Mr. F. C. T. O'Hara, Deputy Minister of Trade and Commerce, never really understood the legal freedom that had been given to the new organization. His need for power made him seek to dominate the National Research Council, which he regarded as a portion of the domain of the Department of Trade and Commerce. This misapprehension brought him into repeated conflict with the legally appointed managers and particularly with the secretary (31, 32).

When three rooms in the West Block of the Parliament Buildings were assigned to the National Research Council, the Council's first secretary, Mr. J. B. Challies, was told to see O'Hara about furnishing these rooms. But Foster's secretary, being a friend of Mr. Challies, took him privately into one of the empty rooms and asked him: "How well do you know Mr. Hunter, the Deputy Minister of Public Works? Ask *him* for furniture, *not* O'Hara."

Challies asked Hunter. Hunter told him to leave town for a couple of days. When he came back he visited Hunter for enlightenment and then saw how the three rooms had been furnished: sumptuous hangings, ornate and comfortable chairs, brass coal scuttle and footrest, an outstandingly beautiful table for the board room, handsome rugs, and so forth—pure elegance throughout.

Standing in the middle of this display was Macallum, astonished by the magnificence, and somewhat shaken by the fact that neither the Minister nor the Deputy Minister of Trade and Commerce knew where all these riches had come from. They had demanded an explanation, and Macallum had just stepped down the hall to see for himself.

As they walked to the Minister's office, Challies told Macallum: "You don't know a thing; leave this to me." Macallum dubiously consented.

In Foster's presence, Deputy Minister O'Hara came forward and fulminated, demanding to know who the Research Council thought it was, spending public funds on opulent furnishings that would embarrass a rajah?

Challies' moment had come. He explained that, when the Parliament Buildings had been destroyed by fire, the Senate was forced to meet elsewhere, and of course suitable furnishings had to be provided for these temporary quarters. Then, when the new buildings were ready, new furnishings were again required for the Senate chambers, and the old, slightly used materials had been put in storage. Officers of the Department of Public Works had been greatly concerned, because these valuable materials were deteriorating in storage and they were very pleased to find that the Research Council was able to use them in the public service. The beautiful table on which the mace had lain was now in use as a board room table, etc. The Council's "new" furnishings had not cost a single penny from the public purse.

When this recital was over, Sir George Foster turned to Deputy Minister O'Hara and said: "Why didn't *you* think of that?"

In dealing with the hostile deputy, the NRC secretaries usually tried to pass him by without O'Hara realizing that he had been passed (31, 32). Normally, this game worked very well, but it did not improve the relationship. It did, however, provide a certain measure of satisfaction to men heavily burdened with administration, and the scientists did not begrudge this simple pleasure to their staff. They rather admired the footwork (33).

Before the end of the year, the membership of the Advisory Council was increased from nine to eleven, with the appointment by Order in Council of S. F. Kirkpatrick, Professor of Metallurgy, Queen's University and Arthur Surveyer, Consulting Engineer, Montreal (34). Macallum reported to the members of the Advisory Council that according to Sir George Foster no further appointments would be made without very good reason and that: "I would be glad to consult with the Advisory Council in the case of appointments to vacancies when such occur . . . though of course, it is to be remembered that the Government has the undoubted right of appointment" (35).

By the end of 1916, therefore, the National Research Council

of Canada had held its organizing meeting and was in business, under a committee of the Cabinet. Canada had a number of first-class scientific institutions devoted to natural resources, such as crops, fish, minerals—institutions that fitted into the corresponding departments of government. But a different sort of institution, aimed at secondary industry and at science in general, had much more of the flavour of a university, to the point of natural divisions into chemistry, physics, and so forth. The freedom necessary in a university was therefore also necessary in the new institution, even if it was disposing of public funds.

This was a revolutionary idea. Up to that time, the direction of *any* institution that expended public funds was naturally and automatically placed in the hands of people trained in administrative procedure; any other way of behaving was inconceivable. Was it possible for scientists to go about upsetting a natural governmental law? The notion that scientists should direct a scientific institution seemed reasonable enough, to a scientist; but to most other kinds of people, the idea that a public service spending public funds should deal with their own staff and budget according to their own wisdom, without a single government official to guide and direct them, was a novelty of the first order.

If the new institution could have been fitted comfortably into an existing department, then undoubtedly this would have been done, out of habit. But the objects were to aid secondary industry, encourage scientific research wherever it was done, and advise the government on scientific matters. This meant that the interests of the new institution cut across the lines of several government departments—not only agriculture, mines, and fisheries, but also trade and commerce, finance, and the old department of the interior. So the "physical" possibility of independence existed; at least the new agency could not be regarded as the exclusive business of a single minister. On this the whole idea depended; without it freedom would have remained dormant for a large fraction of a century.

But it was done and the Canadian government became a pioneer —not at all unwittingly, although today few people have any clear idea of just how this was accomplished; nor is the magnitude of the achievement always appreciated.

Dr. Frank Underhill, speaking in 1965, had this to say:

World War I led to two other developments in our domestic affairs which were of much happier consequences than this desperate English-French affair. One was the reform of our Federal Civil Service which turned it into what it is today, a body of the highest technical and professional skill and integrity. The successful Government of post-war Canada would have been impossible without this development. The other was the setting up in 1916 of the National Research Council. By this step our Government undertook a new national responsibility, the fostering of scientific research for the purpose of making us a more competent people in the modern world, and also a more independent people as we grew out of the dependent status of a parasite upon the scientific and industrial research done in more mature countries.

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1917 · The First Chairman

> "It is not sheer revolt against things as they are which stirs human endeavour to its depths, but vision of what might be and is not."—John Dewey, 1940

EARLY IN 1917, the National Research Council agreed that it should be organized under the outside service and not under the civil service; that the Council should have an existence as a separate body under statute; and, of course, that expenditures should be under its own control, subject only to the approval of the Privy Council Sub-Committee through its chairman (1). A draft of a suitable statute was drawn (2). Dr. A. B. Macallum submitted this draft to the National Research Council (3) and although it was based on general discussion and the agreement of the Council as a whole, its flavour was probably influenced more by Macallum than by any other man. With editorial revision but no change in substance, this Act was assented to on August 29, 1917 (4).

Internal relations were already showing evidence of a dynamic quality. Dr. J. C. McLennan, Professor of Physics at the University of Toronto, was now the president of the Royal Canadian Institute (5) and was deeply involved in a determined movement to establish federally supported laboratories in Toronto sponsored by the National Research Council (6). Winnipeg and Montreal harboured similar desires for local bureaus of research, and McLennan became a champion for all three locations (7), to the disgust of Macallum who was in favour of Ottawa.

McLennan was very interested in nitrogen and was therefore automatically put in charge of committees that had any bearing on this topic (8). Something of the temper of his mind may be gathered from the wording of some of his proposals for the agenda, for example: ". . . to prohibit the export of nitrogenous fertilizing

products from Canada and to have the Dominion government take over and operate existing plants. . . . As electrical power is developed . . . all spare power should be used in the manufacture of nitrogenous products . . . to make it impossible for any individual industry to use more than 10,000 H.P. of hydro-electric power without Governmental sanction . . ." (9). Nitrogen, of course, was a key material in World War I, for use in explosives, and a rather undemocratic attitude was vitally necessary. But the Olympian pose suited McLennan very well and, on this occasion, duty and personal inclination seem to have gone hand in hand.

The Council as a whole were a bit dubious about the resonance of his proposals, and they reduced his Jovian thunder to a soft and pleasing purr, thus:

> Some discussion arose as to whether the matter of the export of nitrogenous fertilizing products was pertinent for consideration and action of the Advisory Council (NRC). It was moved by Dr. Mackenzie and seconded by Dr. Adams and resolved: "That a committee consisting of Mr. Ross, Dr. McLennan, Dr. Ruttan, be appointed to wait upon the Commission of Conservation and similar organizations, with an offer to co-operate with them about the proper utilization of our water powers and the stimulation of Canadian industries in connection therewith." (10)

The order in which these names are given is meaningful: Ross was the head of this committee; the "nitrogen" industry was astutely broadened to "Canadian industries" to make the choice of Ross as convener plausible if not palatable, and clearly Ross and Ruttan were sent along to hold McLennan down. Later in the meeting, Mr. Hobson and Mr. Surveyer were added to this Committee "with Mr. Ross as Chairman" (11).

The wording of this motion shows something of the strength and wisdom embodied in Dr. A. S. Mackenzie, and his ability to control and to put to good use the powerful egoistic engine that was McLennan.

The Research Council decided that a small team should tour the western provinces to find out how science might benefit industry in that region (12). They sent Macallum, Ruttan, Adams, and Challies. Everywhere they went, it was Ruttan who was singled out to be hailed and fêted. For many years, when McGill students got in trouble with the police, they went to Ruttan, who did what he could to bail them out, and supplied the cash for fines, etc. He was

remembered for life, with gratitude, and this formed a solid base for his popularity (12).

When the Mayor of Winnipeg wanted to know the purpose of their visit, he asked Ruttan to speak. He liked the look of the tall, ruddy, thick-set professor. Ruttan said (12) that the situation was simple. The government had set up the NRC under no direction whatever. Technically the Council was under a committee of the Cabinet, but the Cabinet had no idea of what was to be done. In fact their advisory committee was the National Research Council. The Council had sent a delegation to the Prairie Provinces to find out what they had to say. What could the government do, by way of study of special situations, to help the industrial development of a given area? For instance, in Winnipeg, was anybody investigating anything? The Province? No? The city? No? Maybe it was up to the NRC to find out why industry was not being established in a city where power was cheap. He said: "I don't know—'pon my word, I don't know. We're out here to learn, not to tell you anything. We're a bunch of scientists out here to help you—but how? You tell us. We'll stay until we've learned something."

They learned something of the need for fuel (13).

In 1917, western Canada was in a poor position for winter fuel, though Sir Thomas White, Minister of Finance, was not entirely convinced that this was so (14). One possible way to help was by the briquetting of lignite. Here was something practical that the Council could advocate and facilitate. This problem was being attacked in a small way at several plants by the Mines Branch (15). The Council decided that a plant on a commercial scale was necessary, with a capacity of about 30,000 tons a year, and included an item of $200,000 for a commercial-experiment plant in its estimates (16). Macallum, the first chairman of the Council, threw himself into this work with considerable energy.

Long-range work began in the three small but well-furnished rooms in the West Block of the Parliament Buildings: a compact office staff was busy with a survey of the natural resources of Canada.* Four Studentships and three Fellowships were granted, to be held at the Universities of Toronto, McGill, Alberta, and Saskatchewan (17).

*Here and subsequently in the text, the asterisk refers to a document quoted in this volume.

The Conservative Party had been in power since 1911, under Sir Robert Borden. The Unionist Ministry that succeeded it in October 1917 made few changes in the ministers most interested in the National Research Council (18). Sir George Foster continued as Minister of Trade and Commerce, and Sir Thomas White continued as Minister of Finance.

Relations with "the Minister," Sir George Foster, Chairman of the Privy Council Sub-Committee on Scientific and Industrial Research, were cordial;* working relations with the Minister of Finance were not quite so cordial.* Relations with other government departments at this time were excellent.*

The object of the Council—to put science and industry together for the benefit of the people of Canada—was clearly held in mind. The main lines of attack on this problem were already forming. Short-range, immediate problems such as the shortage of fuel were being met by the formation of a board, a process closely akin to the Council's system of associate committees. The long-range needs were already being attacked by a system of scholarships, plus the beginnings of a campaign for central laboratories, to handle problems beyond the capability of industries for decades to come. The Council was full of hope and vigour, as shown by the letters and excerpts from letters that follow.

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DOCUMENTS

RELATIONS WITH GOVERNMENT

TO A. B. MACALLUM FROM FRANK D. ADAMS, MONTREAL, 23 APRIL 1917

Mr. Ross, President Mackenzie and I took the Grand Trunk train to New York on Saturday and had an interesting talk with the Honourable Mr. Foster.

I in the first place gave him a copy of the telegram which Dr. McLennan had sent about the matters at Washington, explaining to him the reference to nitrogen fixation, on which subject he apparently was not posted, and telling him what arrangement we had with the Munitions Board, and the other facts in the case. He said that he would have an opportunity of seeing Dr. McLennan in Washington and wished to understand the exact situation.

Mr. Ross then took up with him the fact that although we had been in existence now for several months we had not yet secured a single permanent employee, and that while there was an immense amount to be done it was impossible to get the work through the office because of lack of staff. Mr. Ross stated that he wished to quietly but firmly protest against the way in which the work of the Council was being hampered through red tape at Ottawa. Mr. Foster said that he wished that he had thoroughly understood the situation before he left Ottawa as he then

would have been able to take immediate action, but there was a mail between Washington and Ottawa and that he would use this for the purpose of expediting matters as soon as he reached the Capital of the United States. We had a very pleasant and cordial conversation, and I think he felt impressed with the necessity of getting things done.

We also impressed upon him the necessity of getting the bill through the Commons at the earliest possible date, and asked him whether it would take long to put it through. He said that he would shove the matter along at the earliest possible moment, and that he himself would personally take charge of the bill when it was going through the House. He stated further that it was largely because he had been so extremely busy with the double duties of Minister of Trade & Commerce and Acting Prime-Minister that matters had not progressed faster than they had done.

We all felt that the interview was as satisfactory as we could expect, and that Mr. Foster, if he is not entirely swamped with the work which comes upon him when he arrives at Washington, will do something or other to make matters advance more quickly.

Before leaving Ottawa I . . . took up with Mr. MeConnell [Deputy Minister of Mines] our decisions with reference to the tar sands of the Athabasca and the oil shales of Lake Erie. Mr. McConnell is well pleased with our action in these matters, and he asked me whether he could get a copy of our resolutions which he might use with the Minister for the furtherance of his work. . . .

P.S. Our locomotive broke down en route and we arrived in Montreal at 10:30 P.M. instead of 7:00 P.M.

TO SIR THOMAS WHITE FROM A. B. MACALLUM, OTTAWA,
6 JULY 1917

. . . I sincerely hope that the budget of the Research Council will receive your approval. I regret my own reserve in conversation with you at an earlier date, in regard to the projects of the Council, but I thought I was only observing the amenities in doing so. I now see that perhaps a little more frankness in regard to those very projects might, without my violating the conventions, have facilitated their acceptance.

Lignite

In regard to the lignite question, the Research Council did not itself propose to undertake the erection and management of the plant required. It expressly designed to give it over to a board of expert business men, with the guidance of one or two technical experts in the matter, whose

work would be carefully inspected by the Research Council. This would meet, of course, your objection to the Council's handling the matter directly.

As to the urgency of the fuel situation in Southern Saskatchewan, I was speaking to Mr. Magrath, the Fuel Controller, who told me that the Saskatchewan Government had circularized every household in Saskatchewan, urging the laying in of fuel in any shape or form, wood, even turf, to tide over the coming winter, and that the situation would be worse, perhaps very much worse, in the following year. He is, himself, very anxious about the matter and is concerned as to the outcome of the Research Council's proposal.

As to the question of failure of the project, the Research Council's Committee has gone about the thing so carefully that there is not at all any likelihood of a failure. The quesion of briquetting has passed the experimental stage. It has passed also the super-laboratory stage, and now it is only a question of the cost which has been put on the maximum side, so that there would be no chance of under-estimation. In this case the cost would not be, for one ton, more than two-thirds of the price of anthracite coal in Southern Saskatchewan, and the thermal value of it would be equivalent to, at least, 90% of the thermal value of anthracite.

Of course, I may make an effort to get private capital to undertake this, but, as you know, capital has been faked so often in the past on questions of peat, and, even lately attempts have been made to do the same for lignite, that those who have money to spend are reluctant to invest it in this way, unless there is a clear demonstration that the process is commercially feasible.

Terms and Meanings

As to your objection to the term, "Studentships and Fellowships", which the Council has chosen to indicate the rank of those whom it is endeavouring to encourage to undertake research on the industrial side and to devote themselves to the development of the technical side of our industries, no other term could be chosen which would carry with it the implication that the Research Council wishes to give to these positions. They are the terms which the English Research Council, the Australian Research Council and the Research Council of South Africa have chosen. If I were put to, to get other expressions than Studentships and Fellowships, I would find it difficult to select them. Some new terms would have to be coined to meet the objection which you urged, which I think is based on local acceptance of the meaning of the terms, "Studentship" and "Fellowship."

It may also be pointed out that the Students and Fellows, as such, must not engage in studies for any University examination. They are to devote themselves during the tenure wholly to research, and, mainly, to research of industrial application. I enclose a copy of the General Regulations.

As to the necessity of training such technical men for Canada, abundant evidence has been supplied recently. There are a great many in the United States, but there are in the Dominion very few, so few that, were one-third of the more important industries involving technical processes to seek for such experts, they would not obtain them.

There are, of course, routine chemists, routine electricians and routine mining men whose training and ideas do not go beyond those which they receive in an undergraduate course in a University or technical institution, and who have not been in any way either trained or inspired for the higher work. It is upon those that have the scientific insight, a special type of mind for research, that the development of our Canadian industries must in the future depend. . . .

TO SIR GEORGE E. FOSTER FROM A. B. MACALLUM, OTTAWA, 18 AUG. 1917

The Committee of the Research Council, appointed in June to interview various industrial organizations in the four Western Provinces on matters affecting important questions which were under consideration by the Council, endeavoured while in Winnipeg and Regina to avail itself of the occasion to discuss with members of the Governments of Manitoba and Saskatchewan the proposal that those Governments should contribute a proportion of the amount necessary for the erection of the Briquetting Plant at some point near Estevan for the purpose of manufacturing from the low grade lignites of that district a fuel equal to anthracite in every respect, with the object of demonstrating that the raw material can be so utilized and at a price per ton that will readily compete with anthracite.

The Committee in an interview with the Hon. Premier Norris on July 10th at Winnipeg and with the Hon. G. A. Bell on July 12th at Regina urged that, as the two Provinces of Manitoba and Saskatchewan are now vitally concerned with the fuel question and will be much more so in a few years, hence their Governments should contribute $100,000 towards the cost of erection of the Briquetting Plant for which the Dominion Government would be urged to give $200,000. The two Provincial Governments would, according to the proposal, be allowed representation

on the Commission having charge of the erection of the plant and the management of it after its operation began. Nothing was advanced at that time regarding the ultimate ownership of the plant.

Both Ministers seemed to view the project favourably, and they asked me to put the proposal in the form of a letter which they could place before their respective Governments for careful consideration at an early date. This letter was forwarded to each of them before July 14th.

Reaction of Saskatchewan

No reply thereto was received and no information regarding the views held by the Government regarding the proposal reached me until August 12th, when, again, in Regina I had an extended interview with the Honourable Mr. Bell and the Honourable Mr. Dunning, Provincial Treasurer of Saskatchewan who were extremely sympathetic towards the proposal but who informed me that as the finances of that Province were far from prosperous, and in consequence the Government had to cut out expenditures, which the Provincial Budget for the present year, as approved by the Legislature, had expressly allowed, the Provincial Government were to their great regret unable to accept the proposal. The Hon. Mr. Dunning stated, as showing how serious the situation is, that the Provincial Government could not get a loan for this purpose for less than 8%.

Reaction of Manitoba

In Winnipeg on the 13th, the Committee had an interview on the subject of the proposal with the Hon. Premier Norris and the Hon. Edward Brown, Provincial Treasurer, of Manitoba. The latter maintained that it was the function of the Dominion Government, which owned all the natural resources of the three Western Provinces and received a royalty on each ton of coal mined, and one dollar on each acre of coal area leased for mining, to develop these resources and to demonstrate that the briquetting of lignites is commercially feasible, and to this end it should provide the whole sum required. After some discussion he and the Premier, who seemed to be strongly in favour of our original proposal, advanced the following proposition which they would strongly urge the Government of Saskatchewan to accept, and which they asked me to place before the Dominion Government:

New Proposal

That the Dominion Government contribute $200,000 and the two Provinces $200,000 for the erection of the plant required, and that when the demonstration of the process is complete, the plant should be the

property of the two Provinces, to be operated by them together for the purpose of controlling the price of the briquetted product, if private companies should undertake to put on the market fuel of like origin and production.

The control of the expenditure of the $400,000 so provided, would, it was understood, be vested in an organization or commission in which the three Governments and the Research Council would be represented.

I would urge that favourable consideration be given to this proposal and that negotiations with the two Governments concerned be entered into for the purpose of giving effect to it.

TO SIR JAMES AIKINS (LIEUTENANT-GOVERNOR OF MANITOBA) FROM A. B. MACALLUM, OTTAWA, 14 SEPT. 1917

I did not write you at an earlier date, as I promised to do, because I found that matters here were at a stand-still regarding the lignite briquetting project, and I was waiting for a decision on the subject of a grant for this purpose by the Finance Minister. I am writing now because I do not wish to delay longer on this score. . . .

The Minister of Finance, in conversation with me, stated that, if the proposal were acted upon, it would be under the War Measures Act, which permits the Government to expend money on projects of primary urgency. I am in hopes that this action will eventuate, for I understand that Sir Thomas White has stated privately that he supposed the Government would have to support the project.

As soon as action is taken upon this matter, I shall let you know what it involves.

TO A. B. MACALLUM FROM J. A. M. AIKINS, WINNIPEG, 18 SEPT. 1917

I have your letter of the 14th instant.

It is clear that, as the letter is marked "confidential" you do not wish me to bring its contents before the Provincial Government; indeed I think it would be inadvisable to do so for, as your Advisory Council is connected with the Department of Trade and Commerce and the creation of the Dominion Government, if that Government will not endorse and assist its enterprise, a Provincial Government could scarcely be expected to do so. When, however, the way is clearer by favourable action on the part of the Dominion Government, and you wish me to assist in the commendable undertaking you outlined, I will be glad to do so.

TO SIR GEORGE E. FOSTER FROM A. B. MACALLUM, OTTAWA, 29 SEPT. 1917

I submit for the approval of the Sub-Committee of the Privy Council for Scientific and Industrial Research the appointments on the accompanying list, which have been sanctioned by the Council.

Two of these appointments, namely, those of Mr. J. F. K. Brown and Miss Beatrice Welling, have been made for the purpose of continuing the work taken over from the Arthur D. Little Co., Ltd. This work was the compilation of an inventory, or survey, of the natural resources of Canada, which that Company under the auspices of the Canadian Pacific Railway Co. undertook over a year ago. . . .

Mr. Brown is a trained mining engineer and of good executive ability. Miss Welling is a graduate in Arts of the University of New Brunswick and has undergone a special training in Library Work in the University of Chicago.

Mr. Eagleson's services in the Research Council's office began in April. He is a returned soldier, who has been declared unfit for further military duty.*

Miss Casserly's appointment has already been made by Order-in-Council, and I understand that Miss Marks has also been formally appointed.

The other temporary appointees will be continued only as long as they are required to get out the questionnaires to the industries, technical societies, &c. and classify them on their return.

STAFF IN THE OFFICE OF THE RESEARCH COUNCIL

Submitted for Approval

Permanent	
Miss C. Casserly, Stenographer, Typist, &c	$1200
Mr. S. P. Eagleson, General Clerk	1200
Miss Gladys Marks, Stenographer, Typist, &c	900
Temporary	
Mr. J. F. K. Brown, Recorder of Natural Resources data	2400
Miss Beatrice Welling, Librarian & Abstractor	1200
Miss Edith Cross, Clerk	600
Miss Ester Bell, Stenographer & typist	600
Miss Nora A. DeLisle	600
Miss Pearl McCagherty, Recording and Indexing	600

*Mr. S. Preston Eagleson joined NRC in 1917, and became its secretary in 1921, a position from which he retired in 1957.—M.W.T.

RELATIONS WITH UNIVERSITIES

TO SIR GEORGE E. FOSTER FROM A. B. MACALLUM, OTTAWA, 25 AUG. 1917

Re the Studentships and Fellowships of the Research Council

The Studentships for the first year of tenure amount to only $600, and for the second year $750. A Fellowship is given only to those who have held a Studentship for one or two years and who have shown during their tenure of it special qualifications in, and capacity for, research. A Fellowship may be granted to candidates who have not held a Studentship, if they have by the completion of some research shown a very high degree of capacity for research.

The holders of these are supposed to carry on their work in some Canadian University, where the conditions are thoroughly suitable, and the accommodation ample, for such researches. It is assumed that when the holder of a Studentship or Fellowship works in a laboratory, the University controlling the latter furnishes the accommodation and apparatus free, as a matter of patriotic duty, and that the investigator, himself, will not have to pay out of the Studentship or Fellowship any sum for the privilege of working there.

The amount involved is, the Council believes, sufficiently large to keep the student for the year, although he is supposed to devote only nine or, at most, ten months to the work which his position calls for.

The Fellowships in the American Universities amount to only about $500 each, and out of this the holders have often to pay fees exacted by the laboratory, sometimes amounting to $100 or $150, or even more. The 1851 Exhibition Scholarships, which have been given for the last thirty years, amounted to only £150 each, out of which the student was supposed to pay all his expenses, even laboratory fees.

The regulations governing these latter Scholarships postulated that the holders of them should devote themselves to some investigation which had for its object the advancement of the industrial interests of the Empire. No promise was exacted from them to this end, but the vast majority of them devoted themselves to technical research work or to teaching inside of the Empire, and many of them are now serving it in one capacity or another.

It was not thought advisable to require a promise from the holders of the Research Council's Studentships and Fellowships, that they would

remain in Canada for service in our industries, but I have felt that the exaction of this promise must be made, and I am going to propose that, while special circumstances may be allowed to make exceptions, the holders of the Studentships and Fellowships must engage to remain in the Dominion, in order to give something in return for the benefits that these Studentships and Fellowships will confer on them.

It is extremely probable that there will, in any case, be few who will wish to go to the United States. The majority of Canadian graduates engaged on the scientific side in the industries of the United States are, it is believed, ready to return to Canada, if they could find here openings for the exercise of their abilities and qualifications.

The selection of the candidates for these Studentships and Fellowships is made only after the most careful consideration of their previous history and training. Special aptitude for research is the primary and essential qualification. The Studentships and Fellowships are not given for merely aiding the student to get a more extensive routine technical training, which would not be of any particular service in advancing our technical industries. The candidates must have in them the promise of developing a high degree of research power.

1918

". . . hundreds of the brightest intellects this country has ever produced . . . had to go to the United States to earn a livelihood. . . . This is a great leak that ought to be stopped."—J. C. McLennan

"The first problem is to breed researchers."—R. F. Ruttan

THE CABINET decided to proceed with Macallum's lignite briquetting proposal.

The various surveys started in 1917 began to bear their small and bitter fruit. Two thousand, eight hundred Canadian industries were persuaded or browbeaten into answering NRC questionnaires—a result that could never have been obtained without the full co-operation of all the scientific, professional, and technical societies, whose members went around personally beating on doors (1). Only about thirty-seven firms in the Dominion had research laboratories, and most of these had one research man per laboratory. Fewer than a dozen Ph.D. degrees in pure science had ever been granted in Canada (2). Macallum estimated that Canada had "not many more than 50 pure research men all told" (3).

C. J. Mackenzie summed up this situation as follows: "By terms of reference the NRC was instructed to coordinate and promote scientific and industrial research in Canada. The NRC soon found that there was little or nothing to coordinate" (4).

The immediate need was for trained men and the facilities to train them. Macallum noted that "the annual budget of the Massachusetts Institute of Technology exceeds the total of the annual expenditures of all the faculties of Applied Science in Canada" (5).

The long-range need was for central laboratories to undertake work with a pay-off too far in the future to interest any industry.

BUILDING UP THE UNIVERSITIES

During 1918, a few holders of Council Fellowships said that they wanted to go to American universities. This was shocking to Macallum, who then realized that the Council's system of scholarships would fail of its purpose unless something drastic was done immediately about Canadian universities.* These had to acquire first-class graduate schools in science as soon as possible. He immediately began a campaign to add half a million dollars worth of facilities to McGill and Toronto. The Council's scholarships system had already been coupled with a system of "grants in aid of research" to universities, in the same relationship as a set of Siamese twins. But in the early days, the Council's total budget of about $120,000 could not provide the large sums required by the universities, and the money had to be obtained elsewhere. Macallum possessed and exerted an ability to extract sums in the low hundreds of thousands, as he had already shown in the lignite briquetting scheme, and he now went about the same process on behalf of the two universities that he considered best fitted. Graduate training in research had to reach a new plateau in a hurry.

But any new endeavour, and especially if it is in a hurry, automatically produces resistance. Macallum was not to have an easy time of it. Rumblings began immediately.*

THE CENTRAL LABORATORIES QUESTION

The campaign to establish laboratories had bogged down in what was politely called a "discussion" about where these laboratories should be situated. This mattered very much indeed to the protagonists,* and Macallum decided to let this clash of opinion wear itself out before he did what he was all along determined to do.* He was not aware that this particular sting of bitterness was in fact permanent, and could not be eased until many years later, when both sides had won. (You may wound a man in many ways and be

*Letter quoted in this volume.

forgiven, but if you found an institution outside the city of a man's allegiance, this you will never be forgiven.)

Had Macallum known, he would still have gone ahead. He already knew a good deal about the high cost of achievement, and was to learn a good deal more in the years that stretched before him.

THE CIVIL SERVICE COMMISSION QUESTION

The Research Council Act of 1917 had given the Council a certain measure of freedom and autonomy. The scientists argued that an independent selection board made up of scientists could do a far better job of selecting and firing scientific staff, and setting of salary levels, than was possible for a civil service commission. They also pointed out that, for this specialized purpose, the Commission was hampered by a wide range of other and vastly different types of interest. This was understood and appreciated, and Section 9 of the Act of 1917 was written accordingly.

From the beginning, the reasonableness of this measure of freedom has been periodically forgotten. Those who review governmental activity are sometimes irritated when they find that government agencies are not all within the purview of the Civil Service Commission. This situation strikes them as untidy. They understand the reasons given, but they sweep these reasons testily to one side, and advocate that nevertheless all agencies be placed under the Commission. The government, which in the meantime has usually been changed, usually follows this advice.

One might wonder at a mind that sees the need of a larger freedom for certain kinds of activity, but nonetheless sets this freedom aside in favour of its own comfort while viewing the wide sweep of all government activities. One might wonder at the kind of mind that agrees with this view, and adopts the suggested restrictions. But these are highly human reactions, and we must accept the fact that force of logic will sometimes be outweighed by an even stronger desire for simplicity. C. P. Snow threw light into this corner in 1960 when he observed that: "Even at the highest level of decision, men do not really relish the complexity of brute reality, and they will hare after a simple concept whenever one shows its head."

The instinctively tidy mind, driven by this desire for simplicity,

has always been with us. Over the years, the Council has learned the truth of Goethe's dictum: "What you have inherited from your father, you must earn again or it will not be yours."

Certainly this is true of the Council's necessary freedom to do its own hiring and firing, and the Council has so far always been successful in fighting its way back into the open air. The government periodically has ordered everybody under the Commission. Then, when the Council has objected, the government has been reasonable about it and let them out.

Throughout the years, the Civil Service Commission, when required, did the best possible job that they could for the Council. Their set-up did not permit them to do anything like so good a job as is done by an independent selection board, but they did their best; and they never tried to force the NRC under their own wing (6, 7).

Presumably, this attempt to be tidy will continue indefinitely into the future. The first swing occurred in 1918, when the freedom granted in 1917 was rescinded, as noted in the letters that follow, in the section on "Relations with Government Control Agencies."

REFERENCES

1. Report of the Administrative Chairman of the Honorary Advisory Council for Scientific and Industrial Research, covering the year ending March 31, 1918, p. 21. National Science Library.

2. Proceedings of the Special Committee Appointed to Consider the Matter of the Development in Canada of Scientific Research, 1919, p. 19. National Science Library.

3. *Ibid.*, p. 18.

4. C. J. Mackenzie, Dinner Address, Canadian Research Management Association, October 3, 1963.

5. Report of the Administrative Chairman of the Honorary Advisory Council for Scientific and Industrial Research, covering the year ending March 31, 1918, p. 24. National Science Library.

6. Verbal, J. B. Challies to M. W. Thistle, March 1961.

7. Verbal, S. P. Eagleson to M. W. Thistle, April 1956.

DOCUMENTS

INTERNAL RELATIONS

TO A. B. MACALLUM FROM J. C. MCLENNAN, LONDON, ENGLAND, 9 MARCH 1918

. . . By the way, I sincerely hope that you will not forget the Bureau of Industrial Research for Toronto. I am convinced more than ever that such an Institution should be in Toronto and that its organization should be similar to what I so frequently indicated. It should be near the University and should have on its staff Members of the University staff, at least in the capacity of Consultants, but it should not be under the University administration, but under an Administration composed of representatives of the manufacturers and the Government as well as representatives from the University and other Scientific Bodies, but the representation should be such that the Government retains control, and next to it the control should be in the manufacturers' hands. Along that road lies safety. You will ultimately have in Ottawa a great National Physical and Chemical Laboratory. It will at first embrace in its activities the work that is being done in a number of Government Departments now, but it will never do the work I have in mind. What I have in mind you will require at Montreal, Toronto and Winnipeg, and while it might be well to establish a small National Physical Laboratory now in Ottawa in connection with standardisation, I believe, in so far as Industrial Research work is concerned, the best results will be obtained from Institutions like the Mellon Institute, to be established at Montreal, Toronto and Winnipeg with administrations of the character I have indicated. I hope you will pardon my writing you about this matter, because it seemed to me during the last year of our intercourse that we were going along paths which were becoming separated. After much consideration and lapse of time, I feel constrained to write you as I have done. It is not the easy road. The easy road is centralized at Ottawa, but along that road lies death, I believe, death and paralysis. It may be difficult to get the right personnel to handle the situations I have referred to at Montreal, Toronto, and Winnipeg, but if you get the right men success will flow

immediately from their activities, and you will be getting the maximum results with the minimum machinery. . . .

My greatest wish for Canada is, however, that the movement we started last Spring under your Chairmanship should advance with the success that I have imagined for it. My best wish for you is that you will be instrumental in guiding it to that success, and if I can help you in any way I will, but it seems to me that we are coming to a time when the question of a central body, or of two or three central ones, must be settled. Who will settle it, or how it will be settled, I do not know. I should like you to be the one to determine the path of destiny, and that the path should be the right one. . . .

TO J. C. MCLENNAN FROM A. B. MACALLUM, OTTAWA,
23 APRIL 1918

. . . Mr. Challies is no longer General Secretary of the Council. His position is that of Recording Secretary for the meetings of the Council.

A new Secretary, salaried, has been appointed. Mr. Lesslie R. Thomson, B.A.Sc.(Tor.) is the choice and is now acting. He will take a great part of the duties I formerly performed and allow me time to devote to the general questions coming before the Council, or to be proposed to it. I am glad that this arrangement was made because the situation was becoming intolerable. Mr. Challies is now quite satisfied with the arrangement, and I think he will always work with the Council, unless some untoward incident arises which may queer things.

I am busy in the preparation of my report and have it, in a large part, drafted. I hope to have it ready in a fortnight. It covers the operations of the Council for the last year and four months. We have some successes to boast of. The Government has accepted the proposition to undertake the lignite briquetting project, for which we asked $400,000, of which $200,000 is now, by arrangement, to come from the Governments of Manitoba and Saskatchewan. We have also carried on a portion of the program for the Forestry Studies.

Our Budget for this year, as put in the estimates, is for $120,000.

As to local Bureaus for Research, nothing has yet been decided. The difficulty in the way of instituting these is greater than you imagine, and simply because Governments are human and it is impossible for them to resist political pressure. The amount of money involved in the two or three Bureaus that were projected in your proposal was small, and therefore, it was not this factor that deterred the Government from accepting

it. It was the constant pressure from various towns throughout the Dominion to have instituted therein Bureaus of Research.

The members of the Government know what pressure means, of all sorts, and they are extremely loath to encourage any manifestations of it in new quarters. If, therefore, the Research Council were again to advance a proposal for the two or three local Bureaus, recommended in the first instance, it would meet the same fate as before. The Council, therefore, must act circumspectly and delay some parts of its schemes until the situation improves.

At present the Council has been discussing the question of a central institute like the Bureau of Standards at Washington, with, in addition, the functions of the Mellon Institute. Ultimately this may be associated, it is suggested, with several local branches throughout the Dominion, but for the present they do not form part of the scheme which may soon be advanced to the Government.

In this connection we are considering the formation of Guilds for research in the various industries, whereby these may be led to pool their funds for research which may be conducted in the industrial portions of the Research Institute, or ultimately, in local branches of it. When this proposal may be finally advanced, I do not know. It would have been now in a concrete form before the Government, but I have asked the Council to consider it more fully before coming to a final decision.

The Council went in February to Washington, Philadelphia and Pittsburgh, to investigate the industrial research situation at these points, but, more particularly, to acquaint itself with the various scientific organizations in Washington. As a result, the members appreciate more fully what must be done in Canada.

I may add that there is only one member of the Council, Prof. Kirkpatrick, who seems opposed to the proposal. He suggested, and maintained his thesis for a considerable time, that any money available for general research work should be spent in professorships in industrial research in the various universities which would make provision, in the way of laboratory accommodation, for the holders of such posts.

This proposal would raise a great deal of difficulty, and the Government certainly would not accept it any more than they accepted the proposal to institute local Bureaus of Research. Much less could be said for it than for the latter. He is now coming round to the view held by all his colleagues and I anticipate a pretty general agreement within the next few weeks on the subject.

There is no doubt that centralisation in England is impossible, and, if possible, would be unwise. What should be done . . . in a population

of 48,000,000 may not be possible in a population of eight million, scattered over a country, and with limited financial resources.

We must make the wisest decision that is possible, under the circumstances, because the right beginning in this matter is going to be the all-important factor in the success of our work. . . .

TO J. C. MCLENNAN FROM A. B. MACALLUM, OTTAWA,
22 JUNE 1918

. . . There is a great deal of difficulty in getting rapid publication, simply because of the unorganized condition of the Printing Bureau here, outside of which we cannot go now because an Order-in-Council has confined all our printing to that Bureau. . . .

One of our great difficulties, in connection with Studentships and Fellowships, is going to be the places of tenure of these positions. Already three of our Fellows have expressed a request to go to American Universities, which the Council did not think wise to grant. When immediately after the war the number of Studentships and Fellowships may be increased to fifty, and, ultimately, to one hundred, the problem will become an acute one, and, in view of this, I am proposing that the Universities of Toronto and McGill should establish Science Research Faculties, composed of staffs specially selected for research work and the guidance of graduates desirous of entering a scientific career.

This proposal is taken up by the Canadian Reconstruction League, of which Sir John Willison is one of the most active officers. If my scheme is accepted, the Government of Ontario will be asked to provide $250,000 a year above what is now given from the Provincial source to that University by the University Act of 1906, and private interests, chiefly industrial, will be asked to guarantee $250,000 a year for ten years to McGill. I do not think it will be difficult to get this latter guarantee. It means that the campaign for it will probably be carried on by the Canadian Reconstruction League, the membership of which consists of a very large number of leading industrialists of Canada.

How Sir Robert Falconer will take this new move, I do not know, but Toronto has been asleep for the last twenty years and it is necessary to give a jolt to the self-satisfaction that it has been exhibiting, and still exhibits, regarding its own equipment and staff. I have not approached him on this subject because I wish to feel my way over the ground to that object. By the way, you will probably see him in London next month, as I understand he is going overseas to attend meetings of the Committee in charge of the Khaki University.

You will receive, about the time this reaches you, copies of the Bulle-

tin on the Need for Research in Canada, and of the Report on the Briquetting of Lignites. These are amongst the first of our publications. A number of others will follow in the next eight or nine weeks. . . .

RELATIONS WITH GOVERNMENT CONTROL AGENCIES

TO WM. FORAN (SECRETARY, CIVIL SERVICE COMMISSION), FROM A. B. MACALLUM, OTTAWA, 16 APRIL 1918

The Honorary Advisory Council for Scientific and Industrial Research, at its meeting on January 31st, resolved to appoint a Secretary, who should give all his time to the duties of the post, in order that my services, as Chairman of the Council, should be devoted more to the work appropriate to my position, that is, looking after general questions and the direction of organizations outside of Ottawa, rather than giving nearly all the time, as I did for a year, to office work.

The duties of the position, it was stipulated, are not to be merely clerical, that is, attending to routine correspondence, but also that of attending to matters, mostly of an advanced technical character, which are to pass before Special Committees dealing with questions involving expert knowledge. He must, therefore, possess a fairly wide knowledge of Science with special training in some one or more technical departments.

There was then, and had been for a year, an Honorary Secretary, Mr. J. B. Challies, Superintendent of the Water Power Branch of the Department of the Interior, but the duties of that position prevented him from giving more than incidental attention to his duties as Secretary of the Council.

At a later meeting of that session I proposed the name of Lesslie R. Thomson for this position and it was resolved to appoint him thereto, but I suggested that final action be postponed until every member of the Council, from the result of inquiries, could be, personally and individually, satisfied that Mr. Thomson was the right man for the position. It was, indeed, my own desire to exercise caution, that prevented action at the time, but, in view of what has happened since, it has produced a complication.

The Council, in whose power the appointment was, at its last meeting definitely and finally decided, after very full inquiry as to all possible qualified candidates, to appoint Mr. Thomson, because his qualifications measured up to what are required in the position. He is a graduate of

the University of Toronto in Applied Science, with the Degrees of Bachelor of Applied Science, and Civil Engineer. He served as Demonstrator in the Applied Science Faculty of the University of Toronto from 1908 to 1910 and as Lecturer in Civil Engineering in the University of Manitoba, Winnipeg, from 1910 to 1912. He has had also experience in various engineering and industrial establishments, and during the last four years has served with the Dominion Bridge Company. Besides being highly qualified as an expert along scientific lines, a qualification which is absolutely necessary for the position, he is an excellent office man, very energetic, possesses a good address, and is highly recommended by all who have come in contact with him, including the President of the University of Toronto, members of the McGill Applied Science staff and of the Canadian Society of Civil Engineers and other professional Societies.

Mr. Thomson is 34 years of age. He has had three brothers in military service at the front, one of whom was killed and one wounded, and he himself, on applying for enlistment, was rejected as physically unfit (Class C 2). There can, therefore, be no objection to his appointment on this score.

Since the Council made the appointment, which has been ratified by Sir George E. Foster, as Chairman of the Sub-Committee of the Privy Council for Scientific and Industrial Research, I have learned that an Order-in-Council, passed in February, has placed the staff of the Research Council under the jurisdiction of the Civil Service Commission, and this makes it imperative that I should apply to the Civil Service Commission for sanction of this appointment.

I am now, accordingly, applying for sanction of this appointment, which is to be for one year, subject to renewal, and at a salary of $2,400.00.

Mr. Thomson has already been serving since the first of the month in this position, and the first monthly payment of his salary will be made on the 30th inst., that is, unless the appointment is not sanctioned.

Mr. Thomson will, in his new post, be more than merely a secretary. He will have to relieve me on occasions in appearing before industrial and other organisations interested in scientific research, to represent the Council. He must, therefore, have qualities which are not common, and these qualities he has. He is a good speaker and presents a very favorable appearance before an audience.

I may add that he intended, if he had not received this appointment, to go to the United States to take service with a large engineering firm for the purpose of extending his experience in engineering and other problems in the United States.

I enclose herewith a copy of the Act of the last Session of Parliament, incorporating the Council and defining its status and powers.

TO SIR GEORGE E. FOSTER FROM A. B. MACALLUM, OTTAWA, 17 JUNE 1918

I understand, from a statement made to me by Mr. O'Hara, that an Order-in-Council has been passed, making it compulsory for all organizations connected with the Government, which issue publications, to have the printing of the same done through the Printing Bureau, and that, consequently, the publications of the Research Council must be arranged for in this manner.

I had hoped that a clause would be put in the Order-in-Council, permitting these organizations to get the printing done outside, provided the tenders and, eventually, the charges for the same were less than those of the Printing Bureau. It seems to me that the charges exacted by the Printing Bureau are excessive, and to escape them it is necessary to give the Research Council the privilege of placing its printing elsewhere, if advisable.

If it is not too late, may I ask that the Order-in-Council be modified to give this permission, under safeguards, to the Research Council? . . .

TO WM. FORAN FROM A. B. MACALLUM, OTTAWA, 9 OCT. 1918

Miss Beatrice W. Welling, B.A., B.Sc., M.A., . . . was appointed as Librarian on the staff of the Research Council, 1st August, 1917. . . .

At that time the staff of the Research Council did not come under the Civil Service Act, but as I understand, this control has been determined by the Civil Service Act assented to on May 24th, 1918, and I desire to get permission to classify Miss Welling in Grade E of the First Division. . . .

I understand that the staff which I had before the Order-in-Council of February last, placing all the Outside Service under the Civil Service Act, are exempt from examination. In her case particularly an examination, entitling her to be classified in Grade E, would be, I think, unnecessary. . . .

TO WM. FORAN FROM A. B. MACALLUM, OTTAWA, 30 OCT. 1918

Yours of October 29th, asking under what Statute or Order-in-Council Miss Welling was appointed Librarian of the Research Council, has been received.

In answer thereto, I enclose a copy of the statute incorporating the Research Council, which, until the present Civil Service Act was passed, had complete and independent control of all appointments to positions in the offices of the Council, subject, of course, to approval by the Sub-Committee of the Privy Council, of which Sir George E. Foster is Chairman. (See clause 9 of the Statute). . . .

RELATIONS WITH UNIVERSITIES

TO THE HON. A. K. MACLEAN* FROM A. B. MACALLUM, OTTAWA, 19 OCT. 1918

In the list of suggested membership of the Associate Committee, which I submitted to you, I think it might be just as well to eliminate Dr. Goodwin's name. Dr. Goodwin is really a member of Queen's University and Dean of its Faculty of Applied Science. Should he be appointed on this Committee, it would be necessary to have the Dean of the Faculty of Applied Science of the University of Toronto included, and this would lead to appointments from other institutions, to balance, and consequently, the Committee would eventually be too cumbersome.

Besides, Queen's University and its Faculty of Applied Science is already represented on the Research Council.

I am writing to Dr. Murray asking him to suggest names for Saskatchewan, Alberta and Manitoba.

TO W. C. MURRAY FROM A. B. MACALLUM, OTTAWA, 5 NOV. 1918

. . . You may recall the discussions that we had regarding the establishment of Graduate Science Research Faculties at McGill and Toronto. This matter has advanced a considerable distance forward through the proposal of the Canadian Industrial Reconstruction Association favoring assistance to the two Universities to enable them to undertake the establishment of such Faculties.

I do not think there will be any trouble about Toronto. The Province of Ontario is wealthy enough to provide the amount required. It is only necessary that the Government of Ontario abolish the Order-in-Council limiting the amount given by the Universities Act of 1906 to $500,000 a year. Had the Act been allowed to operate without this limitation, the University would now be getting about $800,000 from

*At this point, the Acting Minister of Trade and Commerce.—M.W.T.

its share of the legacy duties. As a fact, the University is getting from the Province this year about $780,000, $280,000 of which is to meet the deficit due to the falling off of fees, through enlistment and conscription of students.

Many of the Board of Governors, I understand, are willing to get the help of the Research Council in withdrawing the Order-in-Council in question, to enable them to establish in Toronto the research facilities the country requires.

As regards McGill, the Executive Committee of the Industrial Reconstruction Association is considering the question of appealing to the industries of Canada to come to the support of that University for the special purpose in question, and to this end I have been appointed a member of that Committee. We had our first meeting in Montreal on October 24th, but the subject did not come up, as there was a large agenda list which was not completely dealt with.

The question of approaching the Universities on this score was brought up on Saturday at the Council meeting. Prof. Ruttan, who has been very impulsive lately, objected to approaching the University of Toronto without, first of all, getting a clear pronouncement from the Canadian Industrial Reconstruction Association as to what it was going to do for McGill. He was afraid the University of Toronto would get what it needed and McGill might ultimately be side-tracked and, therefore, left behind.

It seems to me that this is not a very broad way of looking at the matter, as, certainly, the development of the University of Toronto along the line proposed would stimulate the friends of McGill, among the industrialists, to come to its aid. If nothing is done, simply because McGill does not have immediately in prospect the same equipment as Toronto, then we shall never have any progress, and it is absolutely necessary to have fully equipped Science Faculties for Research in Canada.

It was finally proposed and agreed to, in the Council, to have a meeting at Toronto. Dr. Ruttan wished to have a joint meeting with the Executive Committee of the Industrial Reconstruction Association. I am doubtful if that can be arranged for, because, although I have been made a member of that Committee, ad hoc, it refused to accept Falconer and Peterson as members, and it may say that it has sufficient connection or line of communication, with the Research Council through me. Dr. Ruttan objected very strongly to either Peterson or Falconer being members of the Executive Committee.

You will, therefore, see what temperamental difficulties are in the way. . . .

The influenza has cut out the Western visit of President Mackenzie and myself for the present. . . .

TO A. B. MACALLUM FROM W. C. MURRAY, SASKATOON, 9 NOV. 1918

. . . I thoroughly approve of your efforts to do what you can to get assistance for the research work of the Universities. The jealousy between some of the eastern Universities is quite unworthy of them. It is contemptible among small Colleges; between large Universities it is beneath contempt. The success of the one does not depend upon destruction of the other. I know that competition has been the very breath of their existence, and that those Universities that have been dependent upon private endowment have been particularly exposed to the necessity of advertising their wares and watching their rivals. I think, however, the spirit has been intensified more than was neccessary. Esprit de corps is a good thing to a certain extent, but this rivalry is degrading.

We have tried in the west to exclude all possible chances of competition and rivalry. We are able to do this because of the public support received and the fact that the territory of each is limited. Nevertheless we have not hesitated to advise men to go from one to another if they could get better service elsewhere. I hope this spirit may continue. There will be individual rivalry and a certain amount of institutional rivalry, but may the time never come to the Universities in this part of Canada when the success of one institution will be a cause of anxiety and grief to another.

Possibly the best thing to do is to take no notice of these things and to try to believe that better motives have actuated the conduct of the individuals concerned. To take notice of it is to put it on its defence and possibly to augment it.

I fear that it will be almost impossible for me to get down to the meeting on the 22nd, that will be two weeks from to-day. We have been in quarantine for three weeks and have been able to keep the epidemic out of the University residence. Of course, over half of the students have gone home, and our problem, consequently, is greatly lessened. Nevertheless I hardly feel that it would be right for me to go away as long as there would be any danger, for somehow one cannot transfer authority and the means of acting quickly and effectively in times like these. . . .

TO A. S. MACKENZIE FROM A. B. MACALLUM, OTTAWA, 28 NOV. 1918

. . . Regarding the question of approaching McGill and Toronto, your view and my own are not essentially different. It was not my purpose to

ignore McGill, the obtaining of aid to which is a vital part of my proposal. It would be extremely foolish to aim at getting assistance for Toronto without at the same time endeavouring to get like, or approximately like, assistance for McGill. Toronto could not accommodate all the research students who might hold Studentships and Fellowships under the Research Council. A second University, properly equipped, to take our graduate students must be provided, and that second is McGill. If we can get additional Universities, like Queen's, to equip themselves, or assist them to equip themselves, it will be to the good and we should gladly take up that function. . . .

Dr. Ruttan's views as to what should be done change so often that I am somewhat uncertain how to proceed with his assistance. He was of the opinion, a couple of months ago, that the additional aid to McGill would involve the creation of Professorships, the appointments to which should not be left with Principal Peterson but should be made by an outside body. That seemed to me unwise and I expressed myself at the time to that effect. Later, he thinks that there is no necessity for a Graduate Faculty in McGill.

I recognize that the latter institution is, in its Applied Science Faculty, better equipped and staffed than Toronto, but it is, by no means, qualified to take the place of a Graduate School such as we need in Canada in the new era.

I think Dr. Ruttan takes too limited a view of what we should aim at. McGill needs a Graduate School, thoroughly equipped like an American Graduate School of first rank.

In view of the confusion of opinion on the method of procedure, I have had to go alone, seeking to do what I hoped the Council would do or help to do. I interviewed on Friday last, and again on Tuesday, Sir John Willison, who told me that the Industrial Reconstruction Association, from the Toronto side, would bring all possible pressure to bear upon the Provincial Government for a very substantial annual grant to the University of Toronto, to equip and staff a Graduate Science Research Faculty. As to McGill, he pointed out that the representatives from Montreal, of the Industrial Reconstruction Association, are likely to be jealous of any action taken by the Toronto representatives, and he urged that I should bring pressure to bear on the former, the leading one of whom is Mr. Huntley R. Drummond, to get them to act in this matter, so that the Industrial Reconstruction Association, as a whole, could be brought tactfully in to urge upon the friends of McGill the necessity for providing the Assistance that the latter requires.

In consequence of this, I am going to interview Mr. Drummond, and will thus initiate the movement from the Montreal side. How my advances

in this matter will be received I do not know, but I hope that I shall succeed in my object.

When in Toronto I had an interview with Sir Robert Falconer* and Sir Edmund Walker.† Sir Robert expressed himself as desirous of having a meeting with the Research Council there at an early date and of getting its assistance in influencing the Provincial Government to give the financial grant that is required for a Science Research Faculty. I told him that I hoped, sometime before the Christmas holidays, to arrange for such a meeting. I did not tell him of all the difficulties that are in the way. I laid emphasis only on the fact that, owing to the absence of Professors McLennan and Adams, the inability of Mr. Hobson to attend, the proffered resignation of Prof. Kirkpatrick, and the quarantining of President Murray at Saskatoon, it was difficult to get a representative meeting.

I would now propose that we have a meeting in Toronto in the third week of December, for the purpose of discussing with the University Authorities, the Government and the Industrial Reconstruction Association, the means to be taken to procure the aid for Toronto, and then to have a meeting in Montreal immediately following, perhaps the next day, to discuss with the friends and Authorities of McGill the measures to be taken for aiding that institution. Perhaps the meeting in Toronto might be preceded by a meeting in Ottawa the day before. . . .

What do you say to this proposition?

*President, University of Toronto.—M.W.T.

†President, Canadian Bank of Commerce and Chairman, Board of Governors, University of Toronto.—M.W.T.

1919

"... all Ministries should learn to regard the application of science, each in its own particular sphere, as one of its main responsibilities. . . . There is not, and there cannot be, a central organization to carry all this out; the function of any central organization must be to stimulate and encourage this work in others, to fill in gaps, to conduct generalized researches not apt to the functions of narrower institutions, to create organizations and institutions where these are lacking. The function . . . is not that of an employer but of a patron; in a sense, indeed, it is that of an impresario."—Viscount Hailsham, 1963.

THE QUARREL WITH QUEEN'S UNIVERSITY

During 1919, Macallum's scheme for enlarging and strengthening the post-graduate science school at McGill University still looked good; and the University of Toronto campaign still looked bad, but not hopeless. Queen's University smarted from being left out of these doings.* When they realized that Macallum also had his heart set on establishing government laboratories for scientific and industrial research, they promptly attacked this pet idea as a way of getting even with him for his neglect.

In a sense, the protest from Queen's did the Council a service. The Council was forced to make detailed presentations on just why these laboratories were necessary,* and was assured of an audience interested in finding out what the quarrel was about. By calling this need in question, Queen's aroused far more attention for it than

*Letter quoted in this volume.

would otherwise have been forthcoming. The quarrel blew up and blew down again in a year or two, each side delivering about as good a salvo as it received*; the animosity stopped short of destructive effects, after a useful airing of the laboratory question, pro and con.

RELATIONS WITH GOVERNMENT DEPARTMENTS

The growing animosity from government departments was of a different kind. This departmental attitude towards the Council was usually referred to as "jealousy,"* but it went far deeper than that. It was fear.

In the report of the Committee of the Privy Council (1) approved on June 6, 1916, in which they recommended the appointment of an Honorary Advisory Committee, the first two duties listed were:

> (a) To consult with all responsible bodies and persons carrying on scientific and industrial research work in Canada with a view to bringing about united effort and mutual cooperation in solving the various problems in industrial research which from time to time present themselves;
>
> (b) To coordinate as far as possible the work so carried on so as to avoid over-lapping of effort, and to direct the various problems requiring solution into the hands of those whose equipment and ability are best adapted thereto. . . .

These duties certainly were intended to include all scientific work done in government departments. However, although the wording suggested (and was meant to imply) something drastic in the way of house-cleaning, the actual effect was merely to provide an outside, independent advisory committee largely composed of highly qualified scientists.* The technical civil servants concerned could hardly react other than favourably, on balance. Such an advisory committee was almost certain to be a healthy influence. And in fact, the Council's influence in those days was helpful, particularly in calling attention to the dangerously low salaries given to scientific men in the civil service,* and in sympathetic recommendations during a crisis (2). Obviously the Council was interested in high standards of service, which meant that the ultimate aims were identical. Here was a friendly group, all the better for a cold and competent objectivity, advising drastic remedies that no

one on the inside dared to voice. This was the kindness of a good surgeon. The important thing was that the "outside" advisers included enough first-rate scientists to know what they were talking about.

Suddenly, in 1919, the situation changed. Now the Council was proposing to establish a research institute. In their "Draft of Proposed Research Institute Act" (3), Clause 10 reads:

> When for the sake of efficiency or economy, or for the purpose of preventing overlapping of effort in the scientific work of the various departments of the Government, or in the scientific work of the various commissions and boards constituted by the Government, it may be found desirable to provide that such scientific work shall be carried on in the Institute under conditions to be approved of by the Research Council, appropriate action thereto in each case may be taken by the Research Council when directed and empowered to do so by Order in Council.

This put the wind up. The hitherto friendly advisory group were now proposing to establish a physical rival. The departments were unaware that the proposed institute was based on a concept totally different from their own orientation, aimed at scientific research as an aid to secondary industries and as a forerunner to new manufacturing enterprises.* Clause 10 was a relatively minor additional duty, which might or might not become necessary. To the departments, however, this proposed institute seemed to be aimed mainly in the direction of Clause 10. Moreover, the proposal looked as though it had a good chance to succeed: a special committee of the House was appointed,* with what seemed to them ominous terms of reference: ". . . to consider the matter of the establishment in Canada of a National Research Institute for research work in the various industries of Canada and the coordination therewith of the scientific branches of the various departments of the Government. . . ." So there was no doubt that members of parliament were taking Clause 10 quite seriously.

At the time, the civil service was thought to be filled with "empire builders" (4). It was believed that a man's salary depended exclusively on how many people worked under his authority—and that it did not matter whether the workers were clerks or engineers. Some members of parliament had the notion that any increase in numbers of technical people in the service was merely a device to build

empires, and that much of this activity was wasteful duplication. Civil servants in general were regarded as pampered, inefficient people who did not work either hard or long, and who were so secure that they could never be fired. The word "permanent" was getting in its deadly work, doing an enormous amount of damage to the public image of civil servants.

Of course the service of the day had its faults, but reforms had been undertaken based on the statutes of 1908 and 1919, and the merit principle was being pressed home (5). Action had been taken in 1911 to dismantle the party machine in the civil service and to replace it with a non-partisan service (6). The service was already on its way to becoming one of the best in the world, largely on the insistence of men like Foster (7). High quality was not achieved overnight (5), but it was there, and growing.

This quality may be explained partly by a genuine desire to serve the country, a devotion and loyalty that could not be commanded by the rather pitiful rewards that were available in the early days. Some people have a need to serve, and the satisfaction of this need is more important than either fame or money (4). But this does not explain entirely the surprisingly high quality of the Canadian service: one cannot avoid the suspicion that some clever and able men enjoy designing their way around the regulations that hamper them. These not only serve the country; they serve the country in spite of itself, and take a pleasure in it. And it cannot be denied that there is a certain pleasure in hoodwinking large unwieldy entities into a greater competence than they had dreamed of attaining.

In 1919 the scientific branches of government departments felt, quite rightly, that they were here first. They had a long and first-class record in the technical work associated with their departmental duties. When Canada's first great railway was pushed across the continent, men from the Department of Agriculture were dropping off at every measured mile, to sow their seeds and to examine the insects, weeds, plant diseases, etc. The technical work associated with standards, testing, and all the primary natural resources—mining, forestry, fisheries—already had a history and was reaching forward.

It had not been easy. Departments exist for regulatory purposes and to administer some act or acts of parliament. Research and technical work was a johnny-come-lately and was a very junior

part of the total responsibility. Therefore it was forced to fit itself, no matter how uneasily, into an administrative framework designed for a far different purpose, like a small branch of peaches grafted to an enormous apple tree. It was obviously going to be the task of many decades to achieve anything like a suitable working arrangement for science within the framework of government. And this *had to be done within each department*: the technical work was needed in intimate association with specific departmental responsibilities.

Suddenly, in 1919, this enterprise was put in jeopardy by the notion of a National Research Institute. So long as the Council was a purely advisory group, without a competitive physical plant, the departmental scientist remained friendly. But when people both inside and outside the House talked of coordinating and controlling all the departmental technical work, reducing expenditures, eliminating waste and duplication, this was a vastly different matter and something to be feared with very good reason. The least that could happen would be a crippling retardation, and it could mean the death of scientific services within the departments. The long and difficult business of educating their own administrative officials, parliament, and public about the need *for* science and the special needs *of* science—this long endeavour was suddenly interrupted by a battle for sheer survival.

As the following letters show, some of the opening tactics were crudely managed, as in the anonymous charges raised in the House. Macallum could easily handle these (8). Later the civil servants concerned were to be a good deal more subtle and vastly more effective.*

REFERENCES

1. Appendix E, Report of the Administrative Chairman of the Honorary Advisory Council for Scientific and Industrial Research, covering the year ending March 31, 1918. National Science Library.

2. Memorandum by A. B. Macallum dated Feb. 17, 1920, concerning the Mines Branch. NRC Papers, National Science Library.

3. Appendix K, Report of the Administrative Chairman of the

Honorary Advisory Council for Scientific and Industrial Research, covering the year ending March 31, 1919. National Science Library.

4. Verbal, S. P. Eagleson to M. W. Thistle, 1956.

5. A. Brady, in *Canadian Problems* (Oxford University Press, 1933), pp. 43–44.

6. H. S. Ferns and B. Ostry, *The Age of Mackenzie King* (Heinemann, British Book Service, 1955), p. 151.

7. W. Stewart Wallace, *The Memoirs of the Rt. Hon. Sir George Foster* (Macmillan, 1933), p. 143.

8. Letter, A. B. Macallum to Hume Cronyn, April 16, 1919, with an attached statement re anonymous suggestions of official enquiries. NRC Papers, National Science Library.

DOCUMENTS

RELATIONS WITH GOVERNMENT AND UNIVERSITIES CONCERNING A CENTRAL RESEARCH INSTITUTE

TO FRANK D. ADAMS FROM A. B. MACALLUM, OTTAWA, 14 JAN. 1919

. . . The proposal to found a National Research Institute for Canada has made considerable headway. . . . There has been opposition from Queen's, an opposition that resorts to political influence. Appeals to Sir Thomas White have been addressed by Principal Taylor and Mr. Chown, the Registrar of that University. These appeals have come to me for consideration and I have answered them in the form of a memorandum, copy of which is enclosed.

President Murray has written to Mr. MacLean, strongly supporting the proposal for the foundation of the Institute. Ross, Ruttan, Surveyer and Mackenzie are sending in statements and I hope Mr. Hobson will add his to the list. This will greatly impress Mr. MacLean and the members of the Cabinet.

The Research Council met the Board of Governors of each of McGill and Toronto, to discuss the question of increasing research and graduate facilities for those holding Studentships and Fellowships instituted by

the Research Council. The interview at Toronto was not a very satisfactory one. . . .

The interview with the McGill Board was very satisfactory and I hope something will come out of it, that will be worth while. Unfortunately, as you probably know already by cable, Sir William Peterson has had an apoplectic stroke and this closes his career as Principal. McGill will, therefore, have to count time for a year in the matter of development along this line. I hope, however, under a new Principal, things will shape themselves quickly to our liking. . . .

MEMORANDUM REGARDING THE COMMUNICATIONS OF THE PRINCIPAL AND THE REGISTRAR OF QUEEN'S UNIVERSITY ON THE PROPOSED NATIONAL RESEARCH INSTITUTE OF CANADA

The communications on this subject addressed to the Acting Prime Minister, Sir Thomas White, have been carefully considered by the Administrative Chairman of the Research Council, who desires to present a statement of the facts which bear on the question raised.

1. The University side of the Question was given prolonged consideration

The Council, brought into existence over two years ago, comprehends in its membership, amongst others the following:

Dr. A. Stanley Mackenzie, President of Dalhousie University, Halifax, N.S.
Dr. Walter C. Murray, President of the University of Saskatchewan
Dr. Frank D. Adams, Dean of the Faculty of Applied Science of McGill University
Professor R. F. Ruttan, Head of the Chemical Department of McGill University
Professor S. F. Kirkpatrick of the Department of Metallurgy of Queen's University
Professor J. C. McLennan, Head of the Department of Physics in the University of Toronto

These, with the Administrative Chairman, constituted seven of the total eleven members of the Council and this preponderance of representatives of the University point of view excluded . . . any neglect of the part which the Universities of Canada could and should play in the development of the Industries of the Dominion through scientifie research and the application of the most advanced methods to industrial production. Some of these named have achieved distinction in scientific research and are, in consequence, known abroad as leading Canadian representatives of science.

2. The proper organization to promote industrial research in Canada

The question of the proper organization, or organizations, to promote scientific research in relation to the industries came before the Council at its second meeting, in January, 1917, and from May in that year till April of 1918, that is for a year, it was more or less constantly under consideration and discussion by the Council at its various meetings. Although the view that a National Research Institute should be founded developed before the end of 1917 and was supported by all members in attendance except one, the Chairman, regarding the question as of overwhelming importance and, therefore, to be exhaustively considered, prevented the Council from formally recording its decision on it until the meeting in April of 1918. From that decision which pronounced in favour of a National Research Institute there was only one member dissenting, namely, Professor Kirkpatrick of Queen's University, while in favor of it were ranged not only Messrs. Hobson, Ross and Surveyer but also all the other representatives from the Universities, including Professor McLennan who, at the time engaged overseas in research in the service of the British Admiralty, expressed his approval of the proposal by letter to the Chairman. This decision was reached after a thorough consideration of all aspects of the question and the result was not in the slightest degree due to a failure on the part of Professor Kirkpatrick to present the view which the Principal and Registrar of Queen's University are now championing. He ably presented and insistently and persistently advocated that view, and in this he did a service for which the Administrative Chairman desires to express his appreciation. That view, if it could have been found in the public interest, and, therefore, defensible on that score, would have been gladly supported by the University men in the Council, for it would, if adopted by the Government, involve large annual grants to the Canadian Universities from the Dominion Treasury, which they, as University men, would have welcomed.

3. The Recommendation is that of the Research Council

The decision to recommend the establishment of a National Research Institute, therefore, is that of the whole Research Council less one member, and is not that of the Administrative Chairman alone, as Mr. Chown seems to suppose. The Chairman does not evade or even wish to evade responsibility in this matter, but to allow it to be supposed that the decision was his alone or in great part would be a grave discourtesy to members of the Council who have their own individuality and their own wide knowledge and experience of Universities and University work

to guide them in formulating what they consider to be the right policy on this question.

4. The reasons which influenced the Council

The reasons which prompted this decision are not far to seek, and one of these thrusts itself upon consideration when the view advanced by Professor Kirkpatrick and now urged by Principal Taylor and Mr. Chown is examined. There are eighteen Universities, at least, in actual operation in Canada. All of these have teaching staffs in Science, more or less well supported, and all of these would desire to receive grants from the Dominion Government, were it decided to enter on a policy involving financial aid to the Universities. That such aid should be given only to a few which would observe strictly imposed conditions would work in theory, but in practice it would be quickly found impossible to exact these conditions and very shortly all would receive grants, corresponding in each case to the influence each could bring to bear on the political elements in the Dominion. The result would be inefficiency and an orgy of expenditure under no control or system, for an independent Board designed to exercise control would be subject to such pressure and criticism from interested quarters as to hamper seriously its usefulness and prevent it from doing its duty.

That this is not an imaginary danger may be gathered from the history of the university question on this continent and especially in Canada. It is invidious to dwell on this subject and, therefore, it will not be pursued further but what it signified could not be ignored by the Research Council. Is it surprising then that the members of that body who occupy university positions, with one exception only, are opposed to a policy which, if put in operation, would have the serious consequences referred to?

5. The proper functions of Universities in relation to science

The Universities of Canada should concern themselves with research in pure and applied science. These constitute the basis on which all industrial research must be laid. The superstructure must change because the foundations are always being altered, widened, extended or, now and then, in part, discarded. The ideal duty of the Universities is to labor on these foundations in order that they may be securely laid. That ideal is attainable and the Canadian Universities should concentrate all their energies to realize it. They have not done so expressly in the past. Sentiment, opinion and the forces that would make research in science one of the prime functions of a University have been lacking, and, in conse-

quence, the contribution to new knowledge in Science they have made has fallen far short of what it should have been. A few members of the Scientific Staffs of several of the Universities have, in face of incredible difficulties and discouragements, achieved distinction in scientific research, but many more would have done so, had Boards of Governors, Presidents and those who have the power to formulate a policy on this line been not only sympathetically appreciative of research, but also energetically helpful in promoting it.

This is a situation that demands reform and it is of the first order of urgency. The Universities should be equipped and staffed to train the new army of researchers who are to assist in the application of science to Canadian industry. Only two of our universities offer, and inadequately, graduate courses involving research work in Science, and, as a consequence, there is today a great scarcity of properly qualified research men in Canada, a scarcity that is a serious handicap to efforts made to further the development of our industries on the scientific side.

Now, to thrust industrial research into our universities under these conditions is to aggravate the evils of the present situation. Industrial research is urgent, but it is fundamentally dependent on pure science and to provide for the former only on the supposition that the claims of pure and applied science are thus met is to make a profound mistake. It would be fatal to the best interests of our universities. This is true also for the situation abroad and in support of this one could cite the views of many leading scientific men who, because of their experience, are entitled to be heard on this subject, but it will suffice to quote from the address delivered in November last by Sir J. J. Thomson, as President of the Royal Society of London:

> To increase the resources and equipment of the Universities would, I think, be the most effective way of aiding research in pure science. If the grants for this have to come from a fund which has also to provide these for industrial research, there is, I think, no inconsiderable danger that the latter may be regarded as the more urgent and that the claims of pure science may be crowded out.

Is it any wonder then that a broad state aid for industrial and technical research is provided for almost wholly in institutions apart from the universities? Germany, whose rulers were in this matter, as everyone will admit, eminently practical, fostered research in pure science in her twenty-three universities and industrial and technical research in several institutions absolutely independent of the Universities. In Great Britain the National Physical Laboratory, which concerns itself with problems of technical research, and has an annual budget of more than $750,000,

is not connected with any of the British Universities. The Bureau of Standards at Washington, the National Laboratory for technical research, is not affiliated with any University in the United States. The foundation of a National Research Institute for France is under consideration by the French Government. The Australian Advisory Council of Science and Industry has recommended the foundation of a Research Institute for Science and Industry, which is to be independent of the five Universities of the Commonwealth. In Japan a fund of $2,600,000, $1,500,000 of which has been granted by the Emperor and the Diet, has already been gathered for the establishment of a National Research Institute which is to be unconnected with any of the four Japanese Universities. What is there in the situation in Canada that would justify a disregard of all this experience and trend of opinion?

6. The best way in general to aid industrial research

The most defensible policy in the relation of the State to industrial research is that which would put the greater part of the burden of the expense of industrial research on the industries themselves. Unfortunately, all the firms in each line of industry in Canada cannot individually and independently carry on research, but by combining their resources as Guilds for research they could provide effectively for it if it were conducted under the supervision of a highly trained staff such as would direct the work of a National Research Institute as proposed. The only expense that the State would be put to would be that for the accommodation, light and heat in the laboratories of the Institute. This would bring together under the same roof industries with common or related problems, which would insure coordination and cooperation in the researches undertaken to solve them. The results would be of service to all the firms in the lines of industry concerned. The country as a whole would benefit thereby. Without this coordination and cooperation there would be over-lapping of effort and greatly increased expenditure and the result would fall far short of what it should be. To scatter these guilds in the Universities would put a premium on lack of cooperation and unwise expenditure and promote unideal relations amongst the Universities themselves.

When the Institute proposed is founded, individual firms will with their own resources, as now, be free to put their problems for research where they choose, but, as they will wish to keep secret or to patent the results, if they are of value industrially, why should the Dominion Treasury be expected to pay a cent of the expense incurred? From the public point of view there is no objection to any of the Universities

undertaking this work for individual industrial firms for adequate financial rewards, although it may be urged that when, as stipulated in such arrangements, the results shall be kept secret even from students, or patented, this is not fulfilling the ideal function of a university.

7. Objections to Government Control of Industrial Research

It is urged against the proposed National Research Institute that, as it will be a Government organization, it will come under bureaucratic control, and, like the Scientific Departments of the Government, give unsatisfactory results. The Scientific Branches of the Dominion Government have not done all that they should but they have done excellent service for the country as a careful survey of their contributions to Science shows. It is doubtful if politics ever played any part in the control of these organizations and the sins of omission and commission, of which they have been guilty, have been due to other defects. In any case, it is not quite appropriate for representatives of the Universities to indulge in criticism on this score, seeing how remiss in this matter they themselves have been in the past. Who, if he were bold enough and willing to be specific in his statements, could not point out many teachers in the Universities who so far as scientific research is concerned, to use Mr. Chown's phraseology, "petered out" as soon as they received permanent university appointments?

There should be no difficulty in creating the right organization to control the proposed National Research Laboratory in order to make it thoroughly efficient in its service to industrial research, an organization which will keep it free from politics, red tape and which will keep in close touch with the industries of Canada to meet their needs and to do so with no more expense to Dominion Treasury than is absolutely necessary. The National Physical Laboratory of Great Britain, which is under the control of the Council of the Royal Society, does splendid work in the way of research. The Bureau of Standards at Washington, which is under an Advisory Board associated with the Department of the Interior, has a record of service in Scientific research which speaks for itself. The creation of a proper governing Board for the proposed National Research Institute is not, therefore, an impossible task.

8. The Universities and the proposed Research Institute

The proposed Research Institute will concern itself with all measures to promote industrial research and it will have, besides, the function of investigating and thereby determining all technical standards used in the industries and the technical trades in Canada. It will endeavour to investigate the raw materials for new as well as already established industries

and it will strive to lead the way in bringing the most advanced scientific methods to bear on the utilization of the natural resources of the Dominion. The Institute will not concern itself with the research problems of single firms in any industry which can and ought to undertake the total expenses involved. These will, if they think fit, resort to other organizations, Universities included, to have their problems solved or to have new methods and processes provided in their industries, or they may, as some of them do now, maintain their own research laboratories. The existence and operation of the Research Institute will not in the least affect these or their freedom to engage . . . in contracts with University Organizations to do their research work for them, as in the case of the M. J. O'Brien Co. Ltd. and Queen's University. The Universities will, therefore, be as free in this matter as ever they were.

The true functions of the universities as regards research are too well known to require elaboration here. They should concern themselves not only with preparing young men in the lines of science before they enter on a course of training in research, but they should equip themselves to give effectively this training not in industrial research but in pure or applied science which is held by all who have experience in research to be the best field in which to prepare students for a career in industrial research. The problems in pure and applied science are clean cut, of general and permanent interest and their solution may have far reaching industrial application while those which concern industrial research though they are of importance and, therefore, to be undertaken, are, in the great majority of cases, narrower in scope and are not, therefore likely to develop fully the capacity for research in the student. Of the vast majority of the problems of industrial research some are of local interest only, others there are whose solution may lose value because of some discovery in pure science, while others of them are insoluble until discoveries in pure seience make the solution available. On the general principle of utility as well as because of ideals the student who is training for industrial research should during that period concern himself with problems in pure and applied science.

It is the duty of the universities to train such students and to train them well. To train them inadequately, thereby giving them a false ideal and a very limited outlook, is to defeat the hopes of those in the industries who are looking to scientific research to help them in the new and trying conditions which confront those industries. When an individual firm provides a laboratory for research, those engaged to staff that laboratory should be genuine, highly trained researchers and not amateurs or tyros in research.

To produce these highly trained researchers is the urgent duty of the

universities. If the Canadian Universities will not produce them, then they must be brought from the Universities of the United States.

The Administrative Chairman regards this duty as one of urgency and he is led to emphasize it because of his knowledge of the present conditions in Canada regarding industrial research. His experience, derived from research as a biochemist of a third of a century, and from crusading, in season and out of season, for research in Canada all that time entitles him to an opinion on the subject opposed to that of very estimable and well-meaning gentlemen who never carried on research and whose interest in the subject dates, as it were, from yesterday.

9. The Question of the Hour

In concluding this statement, the Administrative Chairman would emphasize, on behalf of the Research Council the urgency of founding the proposed National Research Institute and that the interests of the Dominion as a whole should submerge any sectional interests.

TO J. C. MCLENNAN FROM A. B. MACALLUM, OTTAWA, 28 JAN. 1919

The Proposed Institute

. . . The proposal to establish a National Research Institute at Ottawa has been accepted by the Reconstruction and Development Committee of the Cabinet, under the Chairmanship of Mr. MacLean, but that does not mean that it will be accepted by the Cabinet itself. The question has yet to come up and there is some opposition to it, chiefly emanating from Queen's, which wants all the money for research to be divided up amongst the universities. The other universities have made no such claim, but the needs of Queen's in the financial line are very pressing, and, although it might mean, in the long run, a very great injury to Queen's, the Authorities of Queen's, or, at least, some of them, do not care what the future has in store, so long as the present needs are met.

It is wholly unlikely that the Government will divide the money up amongst the eighteen universities in the country, or amongst a few of them, on certain conditions, because these conditions would be swept away later on by "log-rolling" and "wire-pulling" which University Authorities can use with as much facility as any other war-dealers.

The amount asked to establish the Institute is $600,000: $500,000 for buildings and $100,000 for scientific equipment; $100,000 is asked also for the salaries for the first year. This sum will not, of course, be spent but it is necessary to have enough to cover all that can be done in the appointment of a staff.

The Council has appointed a Committee to look out for a Director, who should be at hand to advise concerning the plans for the building.

Scholarships

The number of Studentships and Fellowships has not increased during the last year. The most appointed so far has been eight, but now that Peace has come, doubtless, the full twenty-five will be awarded during the coming summer. It is possible that the number may be increased to fifty and, eventually, to one hundred, but that is for the near future to see.

Of the eight Studentships and Fellowships appointed so far, only one comes from Toronto and he is in the Physics Department. Six are McGill graduates. There has been some question in Toronto, why so many come from McGill and only one from Toronto. The real explanation is that Dr. Lash Miller is hostile to the Council and does not wish to recommend or encourage anybody to take a Studentship or Fellowship under the Council.

Grants

The grants for Assisted Researches have not been very numerous simply because of the lack of men to carry on research. This situation may improve because quite a number of workers are returning and when the Khaki University closes its doors, there will certainly be a few more to guide research here.

Toronto University

The situation at Toronto is pretty much the same as it was. There are the usual periods of tension inside the Faculty and the same old system of campaigning and warfare is carried on. The Council tried to get the University Authorities to institute a Science Graduate Research Faculty, but Sir Edmund Walker and Sir Robert Falconer stated they could not afford to do anything in that way as they were asking the Government for $2,000,000 for buildings, and this would prevent them from going to the Government to ask for any annual grant for a Research Faculty. It is a great misfortune that Sir Edmund Walker, with his antiquated notions of what a university is and with his efforts, therefore, at mound-building, should be now in control, with Sir Robert acting so assentingly to his proposals.

The Government, I understand privately, are quite incensed at the Board of Governors, and, it is said, they would like very much to shake up and re-constitute the membership of the latter. The Government will

not, certainly, grant $2,000,000 for buildings. That is out of the question, and the fact that such a request is put forward at the present time is an indication of how impolitic Sir Edmund may be. It is wholly unlikely that a Government, facing the United Farmers' Association and fearing revolt in its own following, would undertake for one moment to consent to give $2,000,000, or a fraction thereof, for such a purpose as the Board of Governors of the University have in mind.

McGill University

There is a possibility of getting McGill to equip itself adequately for research along the lines the Council is concerned in. I saw Sir Lomer Gouin* two weeks ago in Quebec and, as a result, it is probable that a Commission of experts may be appointed by him to investigate the needs of the Ecole Polytechnique and McGill University in the matter of scientific research. A committee of citizens in Montreal, to operate with a committee of the Board of Governors of McGill University, will be likely constituted for the purpose of getting funds from private sources for McGill.

Research Council Members

Adams is overseas, Kirkpatrick no longer attends, and Hobson is a member of the Board of Management of Dominion Government Railways, which takes up nearly all his spare time. He wishes to resign but the Council will not think of accepting his resignation. Mackenzie, Murray, Ruttan, Surveyer and Ross are fairly constant in attending the meetings, but it means a heavy burden on them. When you return you can take off their shoulders some of the work.

TO A. B. MACALLUM FROM FRANK D. ADAMS, LONDON, ENGLAND, 11 FEB. 1919

I have just received your very welcome letter of January 14th, and and can quite understand that you have been much pressed with work, not only on account of the general development of the work of the Council, but also in that Lesslie Thomson has gone over to the Lignite Utilization Board. I should fancy he would be about the right man for them, and it is important in the interests of the Council that this Board "make good", so that every possible assistance should be given them as they will probably in any event have a great many adverse circumstances to overcome. You ought to do your best to secure a really good successor

*Director of many banks and other institutions, President of the University of Montreal, and later (1929) Lieutenant-Governor of Quebec.—M.W.T.

to him, seeing that you can put your time to very much better advantage than employing it in overtaking any part of the work of a secretary.

I am very interested to see what rapid progress the proposal of a National Research Institute for Canada has made, and how favourably it has been received by the Reconstruction and Development Committee of the Cabinet and by the Minister of Finance. I hope this may materialize and prove of much real value to the country. Our manufacturers need to be educated to the necessity of applying science to their industry, and a few really successful pieces of work carried out by this Institute will do more to educate them than a great deal of precept.

I am sorry that Professor Kirkpatrick has retired from the Board, especially as his retirement was accompanied by that protest from Queen's. He of course never was one of the most active workers on the Committee, but he had a thoroughly good knowledge of his subject and had himself carried out several valuable researches and made a number of important discoveries. . . . I hope sincerely that both McGill and Toronto may take some steps whereby Research may be advanced in these seats of learning. . . .

The British Research Council

. . . As I have already written to you, the British [Research] Council strikes me as a very business-like, efficient and able body. With the exception of Lord Rayleigh, whom I have never seen at any Meeting, and Sir Charles Parsons, who cannot attend very regularly, the rest of the Members are always present, as well as a number of Assessors who come for special Meetings. On Wednesday last at the Meeting there were submitted a number of very interesting papers, some of which will be of great importance to you. I am consequently sending you the entire papers which were submitted on that occasion. I would direct your attention especially to the Report on the condition of the glass industry in Great Britain, which you will notice has undergone a very serious decline which promises to be continued unless certain steps can be taken to rehabilitate it. There are apparently two principal causes for this decline, one being the fact that they are still using the traditional hand methods of operation, and have not introduced modern machinery which is so extensively employed by their competitors. This I presume is due to the objection to the introduction of machinery on the part of the Trade Unions. Secondly, as pointed out, the industry is suffering very considerably from the absence of the application of modern science; the old Rule of Thumb method being continued from past generations, the result being that the industry has steadily declined, and has passed to other countries.

I also think you will find very important information in the Report of

the Committee on Abrasives and Polishing Powders, as well as that on the Woollen and Worsted Industries and the British Photographic Research Association. These will be of especial importance to you in that they point out definite lines along which research should be carried out in these respective industries. In dealing with our Manufacturers at home it is often of great advantage if one can indicate actual problems which require solution and whose solution will certainly improve the present processes of manufacture, the result being the saving of money and the development of larger industries. . . .

TO R. F. RUTTAN FROM R. BRUCE TAYLOR, KINGSTON, 27 FEB. 1919

My statement regarding the Advisory Council that, "While Toronto and McGill had been given every consideration in the scheme, Queen's had been slighted", is unfortunately an exact statement of the fact and nothing is to be gained by any reticence in the matter. An effort is being made to launch a large scheme of research, but in doing so one of the three great Canadian Universities is being treated as though it had no existence. In proof of this statement I would draw your attention to the following facts:

1. When the Advisory Council was instituted there were included on it, together with representatives of McGill and Toronto, President Murray of the University of Saskatchewan, and President Mackenzie of Dalhousie, Queen's was entirely omitted. It was only when strong representations had been made at Ottawa, through Mr. W. F. Nickle, M.P., that Prof. Kirkpatrick was included as a representative of Queen's. If the Council wished to carry the support of Queen's along with it, this beginning was certainly unfortunate. That this omission of Queen's was not a mistake, but a matter of deliberate policy, is clear enough from what has followed.

2. In a letter to Prof. A. L. Clark, of date 9th Sept., 1918, Dr. Macallum says: "The Government will not give money directly, or through the Research Council, to the Universities to assist them in developing research. It holds that this is the duty of the Provinces which control education in their own spheres. There is no doubt whatever about the attitude of the Government on this subject". However, in a signed statement, contributed by Dr. A. B. Macallum to the Globe of 2nd January, 1919, the following indication of the trend of affairs was given. "A further necessary step will be the working out of the Council's plans for more adequate provision by the Universities for the training of qualified scientific workers. In the more generous investment of State

funds for this purpose, starting say with Toronto, McGill, and L'Ecole Polytechnique, lies the hope of securing for the ensuing years of the world's strenuous and pitiless trade warfare the nation's leaders in scientific and industrial research". Why should L'Ecole Polytechnique have been grouped with Toronto and McGill, and why should Queen's have been omitted? Queen's has contributed to Metallurgical research in Canada certainly as much as McGill and a great deal more than Toronto. Research has always been carried on in Queen's and so far as I know it has never been carried on in L'Ecole Polytechnique, why then was the French School included? Because if anything was to be done for McGill something had to be done for L'Ecole Polytechnique. It was not good policy to exclude the French Canadian element. I admit at once that the political difficulty is great, but the trail of politics has been over this scheme from the outset with the result that an injustice has been done to Queen's.

3. Again, in a statement made by Prof. Macallum at the Royal Canadian Institute on the 22nd. of November last, he is reported to have said: "One of the handicaps of this country is that there are few scientific researchers. If the work must be developed in Canada scientific men will have to be trained. Up to the present there has not been any particular training institution for these men, but Dr. Macallum intimated that part of the programme of the Advisory Council includes the equipment of at least two Universities for such work". The implication of that statement again is that Queen's is being passed by.

4. Prof. A. L. Clark, Head of the Department of Physics in Queen's wrote to Dr. Macallum on 1st. September last regarding some work on the resistance of carbon as used in telephone transmitters, and also on the subject of electrical double layers. No acknowledgement of the letter has been made.

I am well aware that the present condition of research in the Canadian Universities is unsatisfactory. Men are underpaid and overdriven, and the merely instructional side has undue importance given it. But this is a condition that can be remedied. The Advisory Council by drawing the attention of the Governing Boards of Universities to the matter has undoubtedly done something to awaken the Universities, and it can do a great deal more by encouraging the men within their walls. If men are to be trained in research, research must not be divorced from the Universities, and transferred to a Government bureau in Ottawa. Such a move would make the position worse than it is at present. The Bureau would inevitably, things being as they are, become part of the political machine, and appointments to it would become a matter of influence.

The quiet worker would hardly have a chance as against the man who knew the ropes and condescended to pull them. There can be no analogy between such a bureau and the Mellon Institute, free from pressure from without.

However, these matters are beyond the scope of your letter. I think I have made out my case that Queen's has been slighted. I said nothing about money grants from the Advisory Council; I feel sure that no resolutions discriminating against Queen's have been passed by the Council. But the superior person has been abroad in the land, and Queen's resents the implication that in the matter of research it is not worth considering.

TO A. B. MACALLUM FROM R. F. RUTTAN, MONTREAL, 2 MARCH 1919

Just returned from Toronto this morning and find Bruce Taylor's reply awaiting me. It arrived Saturday morning. Note how he dodges the issue!

He is a dangerous man, evidently trying to get the Council to play his game by publicity thus giving him an opportunity of airing the imaginary grievances of Queen's. If I wished I could show up the scientific spirit of research that permeates that institution, but that is not the game. He, however, is not done with me.

He has not marked the letter private but I do not wish you to refer to it. I send it to you at once so you may know his arguments. Leave him to me so far as the slander implied in his Ottawa speech is concerned.

Your letter I saw in the Globe at breakfast in the York Club. It is a splendid letter, temperate, logical and convincing. If I criticize at all it is that you have treated him with too much consideration and explained too fully. Telephone me when you get through.

With kind regards my dear much worried colleague.

STATEMENT TO THE PRESS BY A. B. MACALLUM, MARCH 1919

Principal Bruce Taylor and the "Grievance" of Queen's University

Absence from Ottawa for nearly a week and pressure of duties have prevented me from replying earlier to Principal Taylor's letter of March 3rd. on the "Grievance" that Queen's feels through alleged slights offered it by the Research Council or myself.

It is difficult to carry on a discussion with Principal Taylor. He ignores the amenities fundamental to such a discussion, he indulges in

insinuations regarding his opponents' motives and he resorts to the rhetoric which occasionally characterizes a certain type of politics which he ostentatiously affects to despise. I am not going to emulate him in this style of controversy, simply because I have no inclination for it and I must let him alone attain the distinction, which he aims at achieving in this way.

His letter is crammed with mis-statements, or half truths, and sweeping statements of the ad captandum kind. Three-fourths of his alleged facts are baseless, as are also the conclusions which he draws from the rest. I am not going to deal with them seriatim. Life is too short and newspaper space too valuable to waste either in this way. I shall, however, be ready to do so when an appropriate occasion offers; I may now touch only on two to show how inaccurate he is.

He complains that Queen's was slighted because when the Council was formed in November, 1916, Queen's had no representative on it. As a matter of fact, *there are no representatives of the Universities, as such, on the Council.* Let that, however, pass for the moment. It is very probable that Professor Kirkpatrick or Professor Goodwin would have been appointed on the same day as the other members, but a certain influential functionary of Queen's was trying to get himself appointed as Secretary of the Council. Perhaps Dr. Taylor may verify this fact by questioning the functionary* referred to. It was only when this attempt finally failed that Professor Kirkpatrick was appointed. The Research Council had nothing whatever to do with the appointment of the members, which is a function of the Government.

Principal Taylor says that "proof" of the original exclusion of Queen's (from the Research Council) is to be found in the fact that Professor Kirkpatrick's name does not appear on the letter-head of the Council's early note paper." Professor Kirkpatrick was appointed before the first meeting of the Research Council, on December 4th and 5th, 1916, he attended that meeting and took part in its discussions. His name appeared on the letter-head of the Council's very first note paper prepared about December 10th, 1916. . . .

I may add that Dr. Taylor is solicitous about the danger of politics invading the Council or its organizations. In the more than two years of the Research Council's existence, and since the attempt of the functionary referred to there has not been the slightest effort made by either a Minister of the Crown, a member of Parliament, or a Senator, to affect the work or influence the decisions of the Council. Perhaps they knew they could not do it, for every member of the Council would resist to the

*Mr. G. T. Chown, Registrar, Queen's University.—M.W.T.

utmost the introduction of politics, but I modestly fancy that they had not the slightest desire on that score.

Even if all the alleged "facts" which the Principal gives in his letter were correct, they would weigh as nothing in the issue which crowds into the situation. This issue is: Shall Canada have a National Research Institute like the Bureau of Standards at Washington, to aid in the utilization of the natural resources of Canada and to foster the application of science to our industries? Or, Shall the money which might be available for such an Institute be divided amongst the Universities of Canada to enable them to do this work? That is the whole matter in a nutshell.

Eight out of nine members of the Council, after the most protracted consideration of all the facts bearing on the question, decided to recommend the establishment of a National Research Institute, and six of the eight hail from five Universities, while the one opposed to this decision was a Professor in Queen's. As these are all scientific men, their decision should count for more than the opinion of Dr. Taylor who has had no training or experience in Science. Prof. Kirkpatrick at first maintained that all the money available for research should be divided amongst the Universities on some system of control, but he subsequently admitted that, in addition, a Bureau of Standards should be established. . . .

There are eighteen Universities in Canada . . . about the same number as Great Britain and Ireland have with more than six times the population of Canada. All the Canadian Universities are in a more or less necessitous condition, and, if grants from the Dominion Treasury were going, they would all scramble to get them. No system of check or control could be imposed for it would be swept away under pressure from the forces behind the Universities. Each of them not in receipt of money from the Dominion Treasury, or receiving, as it might think, not enough, would feel "slighted" and there would result a resort to all the arts that characterize the most undesirable kind of politics. Charges of unfairness and of the exercise of favoritism would be bandied about amongst the Universities just as even now Principal Taylor charges unfairness in having Dalhousie and Saskatchewan represented in the Research Council as originally constituted, while Queen's was not. There would be an expenditure on the Universities along this line that would far exceed what would be required for the maintenance of a Research Institute, and there would be very little to show for it in the way of increased industrial efficiency.

All the while research in pure Science, which is a primary function of the Universities, would be neglected or abandoned. The training of the researchers who are needed so much in the industries, and of whom there are so few in Canada, would not be encouraged, for such training

is given best in pure Science, which, as Sir J. J. Thomson recently pointed out, would be in danger of being crowded out of the Universities by industrial research. This, of course, Dr. Taylor does not recognize, but the scientific members of the Research Council recognize the danger ahead, and hence their position on this question.

The Universities of Canada must, in the opinion of the Research Council, look to other sources than the Dominion Government for the funds which they require to provide for advanced scientific teaching and for scientific research. Where these sources are located must be left for each University to determine. They can and should make arrangements whereby the scientific members of their staffs will have much more time for research than they have now. This alone would enormously enhance the research output of these Universities and it would stimulate the enthusiasm of a large number of students who would prepare to enter on a career of scientific research. For such students the Council has established Studentships and Fellowships, which will enable them to achieve their object. It gives grants to University men and researchers generally, who have problems which can only be investigated on the provision for such financial assistance. It is organizing to assist the industries on the scientific side to enable them to hold their own in the markets at home and abroad. . . .

. . . The Dominion faces the task of providing an annual revenue of nearly four hundred millions of dollars and this revenue can be raised only if the country is very prosperous industrially. Scientific Research and the application of the most advanced scientific methods to the industries are therefore of paramount importance if the country is to succeed in raising this revenue. If it does not succeed, what is ahead? A National Research Institute, therefore, to assist the industries in adapting themselves to the situation now confronting them and thereby to help them to bear this enormous burden of taxation, is now of the first order of urgency. This is the hour for vision and all the true friends of Queen's earnestly desire that she will align herself with all those who share it. That is the earnest wish also of the writer.

TO A. B. MACALLUM FROM J. E. ATKINSON (PRESIDENT, TORONTO DAILY STAR), TORONTO, 19 MARCH 1919

Your reply to the Rev. Bruce Taylor was published in the "News" some days ago and you know how averse newspapers are to using letters which have already appeared in one of their contemporaries. We have a rule against republication of letters and I scarcely like to break my own office regulations. I hope therefore you will not think us disobliging. . . .

TO SIR GEORGE E. FOSTER FROM A. B. MACALLUM, OTTAWA, 20 MARCH 1919

Since I wrote you matters have not been going quite so smoothly as they were earlier in the season.

A Special Committee

The proposition to establish a Central Research Institute was accepted by the Reconstructions and Development Committee of the Cabinet, of which the Hon. A. K. MacLean is Vice-Chairman, but it was not approved by the Cabinet itself. There was opposition to it from Mr. Carvell, Dr. Reid and one or two others. Mr. MacLean stoutly supported the proposal and he was greatly disappointed at the result. He, however, is going about it in another way. A resolution is put on the Order Paper of the House of Commons, which reads, as follows—

> That, in the opinion of this House, it is desirable that a Special Committee be appointed forthwith to consider the matter of the establishment in Canada of a National Research Institute for research work in the various industries of Canada and the co-ordination therewith of the scientific branches of the various departments of the Government, with power to call for persons, papers, and records, to examine witnesses under oath, and to report from time to time.

This resolution will, doubtless, be accepted and a committee will be appointed, of which, probably, Mr. MacLean will be Chairman, to consider the whole question. Mr. MacLean is quite confident that the House will support not only the proposition to create the committee, but, also, the report which the committee will bring in perhaps within two or three weeks after it is appointed. Mr. MacLean expects it will recommend legislation establishing a National Research Institute.

Opposition from Queen's

One of the forces opposing the establishment of a National Research Institute is Queen's University, represented by its Principal and Registrar. I am sending herewith some correspondence on the subject, which will enable you to understand what has happened. I have answered Dr. Taylor twice. I shall not probably do so again unless very, very briefly indeed. There is a feeling, practically unanimous, that the authorities of Queen's are opposed to the creation of a National Research Institute simply because they want to get the money for Queen's University. It is the only university that has raised an outcry about the matter. The talk of the "slight" to Queen's has been all put up since the Research Council staunchly opposed their claim that the money should go to the univer-

sities, not to a National Research Institute, and since, also, Mr. MacLean has refused to accept their point of view.

Research Council Members

The Council has been hampered a good deal through the absence of Professors Adams and McLennan in England, the resignation of Professor Kirkpatrick and the proffered resignation of Mr. Hobson. This reduces the number in attendance to six or less sometimes. Mr. Bienvenu has never attended since the first meeting. I saw him a few weeks ago and suggested that, in view of his non-attendance, and in view, also, of the difficulties of the Council, he should resign. He offers his resignation practically on the condition that his son-in-law be appointed to succeed him.

Mr. MacLean is not inclined to accept this condition and has written him that he takes his letter, in effect, as his resignation, and that a successor will be appointed. The successor is likely to be Sir George Garneau* of whom I spoke to you on several occasions during last Summer. Sir George is willing to serve and will make an excellent representative of French Canada.

No one has yet been thought of, in succession to Professor Kirkpatrick, but I would suggest that Professor Goodwin be appointed. This would be expedient in view of the fact that Queen's is claiming now that she is slighted and was slighted when the Council was first formed.

As to Mr. Hobson, no action has been taken, nor do I think it wise to take any just yet. Mr. Hobson, though he cannot attend except very occasionally is still of service and his name is something to conjure with at the present moment.

Estimates

I have asked for a grant of $120,000 for the operations of the Research Council during the coming year. That amount has been put in the estimates. We did not spend half of that this last year, owing to the fact that there were few Studentships, Fellowships and Grants for Assistance to Research. The number of candidates for the Studentships and Fellowships was even lower than it was in the previous year, and there were few researchers available for carrying on work for which grants could be made.

I expect that during the coming year matters will be very different, and that, of the total sum, there will remain little in March next. . . .

*Vice-President, La Banque Canadienne Nationale, Director of several companies (Bell, Continental Life, General Trust, Donnaconna), and a former Mayor of Quebec.—M.W.T.

MEMORANDUM FOR THE HON. A. K. MACLEAN, ACTING MINISTER OF TRADE AND COMMERCE, BY A. B. MACALLUM, MARCH 1919

Re the work and expenditures of the Research Council for 1918–19

The Research Council for the last year projected a very extensive programme of assistance to researches and of Studentships and Fellowships to be awarded to young graduates qualified to train for a career in scientific research. The programme of Assisted Researches had to be curtailed for the first six months or so because of the operations of the Military Service Act, which drew into war work a great many of those who might have conducted investigations along industrial lines.

The Researches for which grants were made are given in the accompanying list. The amount of the estimated expenditure was $70,000.00, the amount actually expended, $10,301.39.

The Council had made provision for the award of twenty-five Studentships and Fellowships, which would have involved an expenditure of about $20,000. Here again the Military Service Act came in. The number of Studentships actually awarded was five, and the number of Fellowships, three. The amount spent for the Studentships and Fellowships was $7,150, instead of $20,000.

The amount expended last year was $61,066.35, out of an appropriation of $120,000.00, which shows how far our programme failed of realization.

I may be permitted to call attention to the importance of some of the investigations for which grants of money were made to assist them.

Wheat Rust Grant to W. P. Thompson

The breeding of a new variety of wheat, that will resist rust, ripen earlier than the Marquis, and have good milling and baking qualities, was one of these, and it was undertaken by Professor W. P. Thompson of the University of Saskatchewan. He has recently reported that he has a variety which ripens two weeks earlier than the Marquis and that he has also several other varieties which are more or less completely rust-resisting. He hopes to get a hybrid from these, which will meet the object of the investigation, namely, one that will replace, and be better than, the Marquis wheat, capable of ripening early, so as to avoid the early frosts of late Summer, and be resistant to rust which is a very considerable scourge of the wheat in the West. The total of the grants made to him was $4,500. He will carry on his work during this year, and the Council proposes to assist him similarly next year if that is necessary.

Iron Ore

Another investigation of importance is that of the commercial utilization of our low grade iron ores, extremely abundant in Canada. High grade iron ores are not plentiful and, in consequence, 98% of the iron ore smelted in Canada is imported from Belle Isle, Newfoundland, or the United States. The utilization of these low grade iron ores, if it can be made industrially feasible, would replace a large part of the ore imported. Prof. Stansfield of McGill University is now attacking this problem and hopes to reach a fruitful result in the very near future. A grant of $2,500 has been made for this investigation.

Fog Signals

The research, by Prof. King of McGill University, on Fog Signalling in the Gulf, has been again subventioned by the Research Council. Prof. King has been engaged on this subject for three years and has succeeded in obtaining results, which, not only will modify the type of siren used in fog signalling, but will also introduce other methods of signalling which may, under certain conditions, especially those connected with heavy fogs, replace the ordinary siren in the Gulf. The amount of this grant was $500.

Ultra-Violet Light

An investigation on the action of ultra-violet rays in certain industrial applications was provided for by a grant of $1,185 to Prof. Louis Bourgoin of L'Ecole Polytechnique of Montreal. This investigation is now being carried out. It is too early to report the results but it is expected that they will be of importance, as the subject has not been investigated to any extent hitherto. . . .

Flotation

The researches of Professor Porter of the Department of Metallurgy of McGill University, on the flotation method of separating Canadian ores from different sources by waste oils from wood distillation, was continued for 1918–19, and involved a grant of $1,500.00. The aim is to ascertain under what conditions and with what character of oils the different ores can be separated from their silica contents or gangue. This investigation, it is understood, is now nearing completion and has given some important results. . . .

Proposed Institute

As a result of very full consideration of the subject, the Research Council has advanced a recommendation to the Sub-Committee of the

Privy Council for Scientific and Industrial Research and, also, to the Reconstruction and Development Committee of the Cabinet for the establishment of a National Research Institute in Canada, which would have the functions of the Bureau of Standards at Washington and, also, of those exemplified in the Mellon Institute at Pittsburgh. The functions of this Institute would be, in more detail, as indicated in the accompanying statement.

This recommendation has not been acted upon as yet, and it is now under consideration by the Committee of Parliament appointed to study the development of scientific research in Canada, which Committee is under the Chairmanship of Major Hume Cronyn, M.P., and is now hearing evidence along this line.

The estimated expenditure for the coming year will be:—

Salaries of the staff of the Research Council	$23,000
Fellowships and Studentships	20,000
Assisted Researches	60,000
Printing, stationery and office supplies	8,000
Travelling expenses of the members of the Council and of the Associate Committees	6,000
Miscellaneous, library, etc.	3,000
Total	$120,000

FUNCTIONS OF THE PROPOSED NATIONAL RESEARCH INSTITUTE

The Institute shall have charge of

(a) the investigation and determination of standards of length, volume, weight, mass, capacity, energy and time, and of the fundamental properties of matter.

(b) the standardization of the scientific and technical apparatus and instruments for Government service and for use in the industries of Canada and of the materials used in the construction of public works.

(c) the investigation and standardization of the materials which are or may be used in the industries, and of the products of the industries.

(d) researches undertaken with the object of improving the technical processes and methods used in the industries and of discovering new processes and methods which may promote the expansion of the existing industries or the development of new Canadian industries.

(e) researches undertaken to promote the utilization of the natural resources of Canada.

The Institute shall have charge, direction or supervision of the

researches which may be undertaken by or for single industrial firms under conditions to be determined in each case or by such organizations, to be known as Trade Guilds for Research, which may be formed in the various industries with the view of improving the processes of production or the products of those industries, as may desire to avail themselves of the facilities offered for this purpose by the Institute.

TO J. E. ATKINSON FROM A. B. MACALLUM, OTTAWA, 28 MARCH 1919

I have your letter of March 19th, in reference to the publication of my reply to the Rev. Principal Bruce Taylor.

When I sent you the original unabbreviated letter, there were sent copies also to the Globe, The Mail, The World and The News. The News, apparently, published it before any other paper, not because it received it before they did, but, one would judge, because it found the space for it.

The Globe thought the letter too long and asked me to cut it down. I did so and sent back the abbreviated copy, at the same time sending a similar copy to you, as a matter of courtesy.

In making this statement, please understand me as not voicing any complaint. If you had published it, I should have been very glad, but, since you could not see your way to doing so, the reason is satisfactory.

I shall, however, be greatly pleased if you can assist the crusade of the Research Council to get established in Canada an organization such as the National Research Institute, which is urgently needed. There are in opposition to it certain friends of Queen's, who think that the money voted for a National Research Institute should go to the Universities. The members of the Research Council, with one exception, are strongly against this, and they are nearly all University men. They recognize what is involved, and that it would be a serious mistake to adopt the proposal of Queen's, from the effects of which it would require a generation to recover.

I hope to be in Toronto some time and I would be glad to have an opportunity of talking over these matters with you, for the purpose of getting the assistance of the Star.

TO A. B. MACALLUM FROM A. L. CLARK, KINGSTON, 9 APRIL 1919

. . . May I assure you that although I am opposed to centralization of research in a Government laboratory and can present arguments and quote the very best authorities to support my view, I believe in the

Bureau of Standards and if you succeed in getting the greater research institute I shall do all I can to make it a success. I believe so strongly in the value of research that I am willing to support any undertaking that promises something. Until I am sure that your plans will carry, I shall do all I can to prevent their consummation because I feel that the policy is a mistaken one. I have talked with the men at Schenectady and at the Western Electric Company, as well as with some of the most prominent American scientists, and to a man they are in favor of an attempt to stimulate research in the Universities, rather than a scheme for centralization. Indeed, I had great difficulty in convincing them that centralization was in the plan of the Dominion Council. I wish that I had space and time to tell you all the things they told me. I feel very strongly that the Honorary Council is missing one of the greatest opportunities ever presented to any body of men to build for the future instead of the immediate present. I cannot find words strong enough to express my convictions on the matter and forbear. It is no will-o'-the-wisp but a clear, steady light that I follow.

RELATIONS WITH GOVERNMENT CONTROL AGENCIES

TO THE HON. W. J. ROCHE (CHAIRMAN, CIVIL SERVICE COMMISSION)
FROM A. B. MACALLUM, OTTAWA, 31 OCT. 1919

. . . I have reinforced my memory by getting a memorandum from Mr. R. G. McConnell, Deputy Minister of Mines, giving the list of all the chemists who had resigned during the last year and a half because of the inadequate salaries given them in the Service. I have Mr. McConnell's permission to send you a copy of the letter which he sent with the list, showing how exceedingly ominous the situation is, so far as the scientific side of the work of the Mines Branch is concerned. . . .

I may add that I appeared before the Committee at the invitation of the Chairman, who stated that he was authorized to ask me to appear. That, perhaps, alone would have made me reluctant to appear, but the Research Council at its meeting on Friday last decided to voice an energetic protest against the classification and salaries of the technologists, as laid down in the Report of the Civil Service experts, which is now under consideration.

If the Departments of the Dominion Government are to carry on research, it is futile to man them with men who are unable to perform this function, except very ineffectively. Further, the choice of those

who are to fill the positions calling for research should be determined by a report to the Commission by men who, themselves, have been carrying on research all their lives and who, consequently, should know more about the service over a series of years than "ad hoc" reference committees to deal with individual appointments. Continuity in this supervision is absolutely essential, especially now that the Deputies have much less control over the appointments than they formerly had.

To the objection that such Committees for the appointments in each scientific line would be open to political or personal pressure, I may point out that it is in the interest of the scientific men themselves, that the scientific posts in the Government Service should be filled by the very best men obtainable, and I do not believe that any Professor in any of the Universities would allow himself to be improperly influenced, by representations, in favor of any particular candidate, should he choose to hear them.

Further, that such a Committee could be swayed by sectionalism, in recommending appointments, is highly improbable, but, if there were the slightest likelihood of such, it could be met by appointing to the Committees members of the Staff of Dalhousie and of Manitoba Universities for example.

In making these representations to you, I do not wish to be considered as reflecting in the slightest on the earnestness and honesty of the Civil Service Commission, which, I think, are beyond question. I do think, however, emphatically that, in the matter of the scientific posts of the Government Service, the experts were, to speak with some reserve, scarcely qualified to classify them or to determine the salaries which should be attached.

MEMORANDUM BY A. B. MACALLUM ON THE CLASSIFICATION AND SALARIES OF THE TECHNOLOGISTS IN THE CIVIL SERVICE, 28 OCT. 1919

The salaries given in the revised classification of the Civil Service, now under consideration, are in many cases utterly inadequate to secure the services of the best men qualified for such positions, and this is true, especially, of the Junior and Assistant positions.

For instance, the salary for the Assistant in Chemistry, or the Junior Botanist, namely, $1,320–$1,680, is quite insufficient and suffers by comparison with positions in the leading universities of Canada, which call for the same qualifications. Further, these Assistant and Junior positions, if once accepted and retained for a few years, make it difficult for the holders to start in university careers, even at a lower salary, as it

takes them out of the sphere of competition in this line and puts them behind others who graduated at the same time. This is a handicap that is hardly appreciated, and it cannot be too much emphasized, because it entails the elimination of candidates for these posts who, able and ambitious, desire to enter on a life work under conditions that are more promising than those offered by the Civil Service. Further, candidates who accept such low-salaried appointments are not likely to have had as thorough a training in research in order to carry them on and to prepare them for any higher position when it becomes vacant. In consequence, it is likely that, once appointed, such candidates become purely routine men, and eventually, as regards all the best work of the service, inefficient.

There is also discrimination, so far as salaries are concerned, between such positions and others in the Service which do not call for as high a degree of attainment, either academic or technical, as they do. . . .

It is impossible to refer to all the anomalies that are indicated in the classification. It suffices to place them side by side. . . .

To provide for thorough-going efficiency in the technological branches of the Civil Service, there ought not only to be adequate salaries but a thorough scrutiny of the qualifications of the candidates for the positions which fall vacant. One qualification, the training and the capacity to carry on research of a high order, should be placed before all else, and the question, whether the candidates have this training and capacity can only be determined by researchers in the particular business which may happen to be concerned.

This careful scrutiny of the candidates' qualifications, as regards research, is certain to fill the lower positions, if adequately salaried, with men who are likely to develop and do the work of their positions with credit to themselves and to the Service. This scrutiny should be made by a committee, annually appointed, and for each scientific department, composed of the leading university professors of the science through Canada.

Such a committee, in each case, would be thoroughly qualified to make the best selection possible from the applicants. Each committee would be kept in existence, whether there are any applicants for the positions or not, but, as soon as one becomes vacant and applications are received for it, the committee could at once act and report its recommendation, for appointment, to the Civil Service Commission.

As regards the higher positions, the salaries are in some cases very inadequate. It is impossible to deal with all of them, but I may refer to several which concern, especially, the natural resources of Canada. One

is the Directorship of the Mines Branch, which begins at $3,900 and reaches $4,800. This will not attract the kind of man who should fill such a position. It further calls for attainments and achievements in the holder that would win him, in a university post, a better salary and with opportunity for greatly increasing his income. . . .

RELATIONS WITH GOVERNMENT DEPARTMENTS

TO WM. PEARCE (CPR) FROM A. B. MACALLUM, OTTAWA, 20 OCT. 1919

Re *Pulverized Fuel*

I have your favor of October 1st on the above subject, which I appreciate. . . .

The Research Council endeavoured to effect some arrangement whereby a report on the subject for Canadians interested might be prepared, but difficulties arose, chiefly through the curious psychology that develops in Government Departments. The jealousy that was manifested in this connection was beyond any expectation of mine.

As soon as I had proposed it, the Conservation Commission dug out a report nearly two years old, by W. J. Dick, and not brought up to date, but yet it was published. The Mines Branch announced that they were making experiments on the subject and were preparing a report. . . .

To complicate the situation still further, another Department of the Government, namely, the Water Power Branch of the Department of the Interior, brought about by Order-in-Council the creation of the Water Power and Fuel Board, consisting of a number of representatives of the various Government Departments, but with actually no power to do anything more than inquire, but with ambition to take up work of an experimental character, including that in which you are now interested.

The creation of such Boards clutter the road of progress, and discourage anything like effective work. The whole question, for instance, of the proper utilization of Alberta coals may in this way be hung up simply because of disorganization.

I am firmly of the opinion that, associated with the proposed National Research Institute, which the Research Council is now striving to bring about, there should be a Coal Research Institute established somewhere in Alberta to take up the proper utilization of its coals, the preparation of by-products from them, and the development of the coke industry. . . .

With about twelve hundred billion tons of coal in Alberta, there should be concentrated on this supply all the best brains available for its proper utilization.

I have written thus freely and confidentially because I wish you to understand that the Research Council has not been heedless of the proper utilization of Western coals.

TO A. B. MACALLUM FROM WM. PEARCE, CALGARY, 7 NOV. 1919

. . . I quite sympathize with you, having myself experienced the trouble that your Council has in obtaining the desired co-operation of the various Departments of the Dominion Government and I presume also of at least some of the Provincial Governments, which want of co-operation is caused largely by jealousy in some cases overweening conceit alleging that the position demands the course pursued. . . .

The files of the various Departments are replete with invaluable information but the public who would be benefited by it know nothing about it. Then we have two or three Departments working on the same lines. As an example, at least last year and probably this year three Departments were doing the same style of work and practically over the same ground, precise levelling. Wonderful to relate, two came under the jurisdiction of one Minister. The Public Works Department, Geodetic Survey Branch and the Survey Branch of the Department of the Interior were doing it and possibly some other Departments were also. They were carrying it on without any reference one to the other and in many cases they went over exactly the same lines or others in the neighborhood of.

I could cite many other cases showing as idiotic a management as the foregoing. It would take a very strong man or a number of them to apply the remedy, but that it should be applied there is not the slightest doubt.

When I think over the waste of money that is going on by reason of such foolishness I can hardly contain myself. If I were free from connections with large interests and had I sufficient money so that I need not care for the future, so far as my finances are concerned, nothing would suit me better than to start a crusade against the waste and lunacy manifested in the management, not only of the Federal, but many if not all of the Provincial Governments. . . .

P.S. being an official of the C.P. Ry. I cannot move in this matter. Can only express my private opinions. . . .

1920–1921

"The trouble with the popular notion of
utility is that it confuses immediate and final ends."
—R. M. Hutchins, 1936

"When a society is penetrated, as ours is,
by technical skills and engines, the decisions of state
cannot be taken out of the context of science. . . ."
—J. Bronowski, 1956

BY 1920, the National Research Council had found that there was no quick, easy, magic method to put science and industry together for the greater good of Canada. This would need a continuing effort over many years. There was no thought of despairing: these were youthful problems and they were met with the characteristic postures of youth. The Council accepted that all the ways to their object would be long, slow, painful, and difficult, and they had already set to work on whatever their surveys had shown to be both necessary and possible.

The first need was for an increasing supply of men trained in the scientific disciplines, and therefore a need to support the science faculties of universities. By 1920, the scholarship programme was at a level three times higher than was possible under war conditions, and the programme of grants in aid of research at universities had also increased. Few of the Council members would live to see the first full harvest, but this did not affect their enthusiasm or their devotion to this job of selection for which they were so much better qualified than any other body in the country. Not that it was always easy for them; like any other task worth doing, it had its prickles.

The second need was to create coordinating machinery for each new technical problem as it arose, and so to make the best use of whatever talents and facilities were available. By 1920, the Council's system of creating associate advisory committees for this purpose had hardened into a peculiarly Canadian device; that is, it fitted a country with vast areas, a small population, and very little money: all members served without compensation, and were glad to do it because it kept them in the picture—and their travelling expenses were paid.

The third need, obvious to all members of Council from 1917 onward, was to create government laboratories that would undertake long-range industrial research that no one else would do. This was obviously one of the ways in which to put science and industry together for the greater good of Canada.

In those days, the most effective scholarship scheme and programme of research grants could be mounted in that kind of society at a quite piffling cost even by their own standards of expense, and the costs of even large committees were quite minor. But the founding of a reasonably effective laboratory was a quite different matter, approaching the order of a million dollars. This kind of expense, for a new and untried venture, called for second thoughts.

Second thoughts were about enough. However, the government had followed their second thoughts with third and fourth and fifth thoughts. After the most exhaustive enquiries, the National Research Council had recommended the establishment of a central research institute in 1918. The Union Government, being unwilling to act on this report, appointed a select parliamentary committee in the spring of 1919, under the chairmanship of Hume Cronyn, M.P. for London, and this committee had endorsed the idea of a research institute. Still unwilling, the government appointed *another* select committee, again under Hume Cronyn, in 1920. This committee came to exactly the same conclusion. Still the government refused to act. Cronyn began to think about resigning.

Macallum's interest in the National Research Council was to get it organized and running smoothly, but he could not regard this work as finished until central laboratories could be provided. He was never a candidate for the directorship of these laboratories; on the contrary, he felt a powerful attraction to the university atmosphere, especially if he could arrange to do rather more research

than teaching. His reputation was high throughout the world and, in 1920, McGill created a chair in biochemistry specifically to attract Macallum,* and to lure him away from his full-time post as chairman of NRC.

At about the same time the Rockefeller Foundation asked Macallum to go to China for five months to lecture and to help organize the Peking Medical School, and they offered to arrange leave of absence from McGill for this period.*

These tempting offers happened to coincide with a definite assurance by the Prime Minister, at long last, that a National Research Institute would be established at the next session of parliament.* Macallum considered that this promise of laboratories made a fitting close to his career as administrative chairman and that it had set him at liberty to follow his academic bent. He therefore resigned as chairman of the National Research Council but retained his membership.

In 1920, the situation between the Council and the scientific services of government departments continued to smoulder underground. The beneficial "advisory committee" activities continued on behalf of the Mines Branch, and on behalf of scientists in the civil service generally.* The Council continued to advise the government on matters scientific, on this occasion through the Hon. Arthur Meighen, Minister of the Interior, who did not succeed Sir Robert Borden as Prime Minister until July 10, 1920.

The dynamics of "avoiding duplication" even when it consisted of the Council giving up its "committee" efforts on industrial hygiene in favour of the new Department of Health resulted in open animosity.* Sir George Foster, in describing this bit of sword-play to the Prime Minister, makes a delightful use of the word "brief"* referring to a letter consisting of exactly ten sharp words of one syllable each.

On the internal front, Macallum and McLennan, who held widely differing opinions about which city might be the best site for the research institute, continued to drift apart. On the other hand, Macallum and Mackenzie came closer together.*

The question arose, should the chairmanship of the Council be distinct from the directorship of the National Research Institute? Sometimes it was felt that they should be separated. Later the

*Letter quoted in this volume.

suggestion was that they be combined,* but Macallum recognized that an extraordinary man would be needed for the dual responsibility. He did not covet this post for himself.*

During 1920, the influence of Hume Cronyn became an extremely potent factor in the affairs of the Council.* He became just as impatient with the delay in establishing the institute* as any member of Council.

During July of 1920, Sir John Willison, editor of the Toronto *News*, informed Meighen that Hume Cronyn wanted to resign because the government had failed to make an appropriation for "an Industrial and Scientific Bureau" at Ottawa (1). Meighen told Cronyn that the government was anxious to avoid duplication, which was already excessive. He cited the Forest Products Laboratory, the Mineral Research Laboratory, the Timber Testing Institutions, etc. (2).

Cronyn replied: "Without offence . . . the Government has apparently failed to grasp the intent or significance of the proposal to establish a Central Research Institute" (3). Cronyn argued, for instance, that the institute, far from creating duplication, would serve to eliminate it. He pointed out that the Advisory Council was operating in 1917 and, after exhaustive inquiries, had recommended the establishment of a central institute. The Union Government was not prepared to act on this report and had appointed a select parliamentary committee in the spring of 1919, and reappointed the committee in the spring of 1920. Both committees had approved the proposal, and so had all the important Boards of Trade. Yet, said Cronyn, not a single member of the Cabinet except the Minister of Trade and Commerce had studied this matter. He said that the government should not overlook the experience of other great industrial nations (3). Meighen urged Cronyn to confer with Drayton, the Minister of Finance, and Calder, President of the Privy Council (4).

One of the earliest grants made by the NRC was to support Professor W. P. Thompson of the University of Saskatchewan in his work on rust-resisting varieties of wheat. The Council continued to support this very promising work and, by 1920, it was known that there were many varieties of rust.

In November of 1920 Lord Shaughnessy, President of the Cana-

dian Pacific Railway, informed the Prime Minister that he was sceptical of the value of government research:

> When the Department of Industrial Research . . . was organized, it had my personal support. Professor Macallum and several of his associates are my warm personal friends and, therefore, I would not wish to say an undeserved, unkind word about the work of the Department. I must confess, however, that up to the present time, there has not come under my notice one single thing in the way of accomplished results to warrant a fraction of the expenditure that has already been made, and that would, of course, continue to be made on probably a larger scale if there be no interference. I may be all wrong. . . . I cannot help feeling it would be worthwhile to look into the matter.
>
> Some years ago we organized a similar Department under the jurisdiction of chemists with an international reputation. At the end of a year or more, when a sum in excess of $75 thousand had been expended, I was unable to find that anything of a practical character had been accomplished, and the Department was abolished. (5)

Apparently, the palaeolithic idea of looking for practical results in a single year did not strike the Prime Minister as being peculiar. He said that he thoroughly appreciated Shaughnessy's letter, and he confessed that in fact he had had some thought along this line himself:

> I very much appreciate your letter. . . . To tell you the truth I had some thought along this line myself. The progress made in other countries, however, has stimulated quite a body of opinion in this House and indeed among the very best members of the House, that a concentration of research work in Canada in a comprehensive and practical way, would bring great returns. . . . (6)

Meighen's letter is so skilfully written, paving the way for greater efforts in research while nevertheless agreeing with Shaughnessy's viewpoint, that it is impossible to tell if he was actually as uncomprehending of the needs of science as he pretends or if in fact he was so easily swayed by the very best members of the House. In any event, he had already promised the Institute.*

In December of 1920, Cronyn wrote Meighen to point out that Macallum had resigned as chairman of the Advisory Council. Macallum had recommended President Mackenzie of Dalhousie to succeed him. Cronyn knew little of Mackenzie but favoured

Professor McLennan for the post: "The former chairman does not favour him, because he questions his diplomacy. I have a feeling—more instinctive than based on evidence—that there must be some personal antagonism between these two men, resulting from their long academic connection" (7). Cronyn added:

There has been some criticism of the Council upon the ground that it is made up too largely of university professors; in other words, that it lacks business knowledge and grasp. There seems to be some truth in this criticism. The man needed as chairman should, first and foremost, be a good administrator, but he should be far more than that, as it would certainly be part of his duty to win the confidence and co-operation of the other departmental heads of the Government. . . . (7)

Meighen answered:

I know both President Mackenzie and Doctor McLennan well. The latter was a lecturer while I was a student at the University of Toronto. In point of equipment as a scientist . . . I could think of no one his superior. Temperamentally he is disposed to animosity, but how far this would disqualify him is a question. I would think this subject likely will stand until the return of the Minister of Trade and Commerce. . . . (8)

Macallum presided as administrative chairman for the last time on February 19, 1921. He left for China in March. He was reasonably sure that his object had been attained and that the National Research Institute would shortly become a reality.

The greatly disturbed scientific service groups of government departments had sent representatives to this meeting of Council for an interview. These were told the simple truth, that the NRC had no interest whatever in taking over their routine functions.* But this was not said loudly enough, firmly enough, often enough to "sink in." Against this verbal assurance lay the cold and ominous point of Clause 10 of the draft act as published (9), and the fear remained. This clause said clearly that any scientific work could be taken from any part of the government service and placed in the institute by Order in Council.

Macallum says that every Council member present at this meeting went away satisfied. He recognized that the members of the civil service constituted an "explosive situation,"* but he had no idea of how deeply disturbed they were. They at least did not go away satisfied.

REFERENCES

1. Letter, Sir John Willison to Arthur Meighen, July 14, 1920. Meighen Papers, vol. 41, file 184, P.A.C.
2. Letter, Arthur Meighen to Hume Cronyn, July 17, 1920. Meighen Papers, vol. 41, file 184, P.A.C.
3. Letter, Hume Cronyn to Arthur Meighen, July 26, 1920. Meighen Papers, vol. 41, file 184, P.A.C.
4. Letter, Arthur Meighen to Hume Cronyn, July 29, 1920. Meighen Papers, vol. 41, file 184, P.A.C.
5. Letter, Lord Shaughnessy to Arthur Meighen, Nov. 11, 1920. Meighen Papers, vol. 41, file 184, P.A.C.
6. Letter, Arthur Meighen to Lord Shaughnessy, Nov. 24, 1920. Meighen Papers, vol. 41, file 184, P.A.C.
7. Letter, Hume Cronyn to Arthur Meighen, Dec. 7, 1920. Meighen Papers, vol. 41, file 187, P.A.C.
8. Letter, Arthur Meighen to Hume Cronyn, Dec. 8, 1920. Meighen Papers, vol. 41, file 187, P.A.C.
9. Appendix K, Report of the Administrative Chairman of the Honorary Advisory Council for Scientific and Industrial Research, covering the year ending March 31, 1919. National Science Library.

DOCUMENTS

INTERNAL RELATIONS

TO A. S. MACKENZIE FROM A. B. MACALLUM, OTTAWA, 4 OCT. 1920

. . . There was one subject in dealing with which you were concerned. This was the selection of a successor to myself as Administrative Chairman of the Council and action had to be taken on it in your absence. A decision reached, which was a unanimous one, was that you be asked to accept the nomination to the position. All felt that you would admirably fill it and that, in consequence, the projects of the Council, which had been advanced up to a stage of considerable success, would be certain to be realized.

The position does not now involve as much work as it did for all the plans for the development of research along scientific and industrial lines in Canada have been completed and a considerable amount of acceptance has been obtained for them. This is particularly so with regard to the projected National Research Institute. The Prime Minister, the Hon. Mr. Meighen, assured the Council at a dinner at the Country Club on the occasion of the last meeting, that a start would be made in the establishment of this Institute at the next Session of Parliament and he urged the Council not to be at all discouraged over the situation.

You will, therefore, see that there is an interesting career for you as Administrative Chairman, if you accept the nomination of the Council to this position. You will have a wider field than you have as President of Dalhousie University. I believe that you will find many more consolations in it for your sacrifices than you have had during the last few years in the Presidency of Dalhousie University and you will have a very much smoother path to success than I have had here.

That you will accept this nomination is, let me repeat, the earnest wish of all those present at the meeting. The only ones absent from it were Mr. Surveyer, who was in British Columbia, Mr. Lloyd Harris* who is recovering from an attack of abscess in the middle ear, President Murray and Professor McLennan who has just returned from England and could not stay over for the meeting while passing through Montreal. . . .

TO J. J. R. MACLEOD (DEPARTMENT OF PHYSIOLOGY, UNIVERSITY OF TORONTO) FROM A. B. MACALLUM, OTTAWA, 9 OCT. 1920

. . . You will have the reason for my resignation of the post of the Administrative Chairmanship of the Research Council in the fact that the Premier, the Hon. Mr. Meighen, assured the Research Council at its September meeting that at the coming Session of Parliament legislation would be introduced establishing the National Research Institute and that a vote to provide for the construction of the first building for it would be included in the Estimates. This is the central and dominating point in all the organization formulated by the Research Council during the last three or four years and its acceptance by the Government means that the work of organization in which I was concerned is to be completed, and very shortly. I wanted to leave the post a year and a half ago but was persuaded by the Council to remain until this scheme of organization was accepted by the Government. Now that it is I feel myself free to exercise my choice. If I remained longer in the post I should have

*Director, Massey-Harris Co. Ltd., Toronto, and of many other companies.—M.W.T.

had to go to the United States for what I want, a thing I did not care to do, or to go into some private establishment to carry on research where perhaps I should not have been as free as I would in a University position. The McGill post was created and, in view of my possible acceptance, conditions were attached to it which made it extremely desirable to me and I could not therefore refuse without being exposed to the possibilities of exile from Canada.

I am to remain a member of the Council and will play my part in its work by advice, which will be the result of my experience, and by active participation in some of its projects. I shall further be freer to utter my opinions in public about some of the matters which will be concerned with research in Canada, especially on the Government side here. I am, therefore, not going to retreat wholly from public work along this line.

. . . The Research Council has been always afraid of being charged with duplicating work done by other Departments or encroaching on their functions and when it learned that the Department of Health at first objected to the name of Industrial Hygiene for your Committee it became very much alarmed. In consequence, it passed a resolution that the Department of Health should take this work over. What happened you may gather from copies of the correspondence which are enclosed. . . . What will develop later I do not know but we shall see what the Government is going to do with Dr. Amyot's extraordinary letter. . . .

TO A. S. MACKENZIE FROM A. B. MACALLUM, OTTAWA, 9 NOV. 1920

. . . He [Sir George Foster] and the Prime Minister do not believe that the staff of the National Research Institute should be under the Civil Service Commission, nor, for that matter, does any sane person in Ottawa.

I am strongly of the opinion that by the middle of January the situation will have cleared up wholly and that our proposition will be accepted but the Council itself must be staunch in its attitude and not accept irresponsible suggestions such as those referred to by Professor McLennan.

The Council must, at the December and January meetings, make its position quite clear as to what legislation is required and what should be the constitution of the Research Council. A clear-cut proposition on both subjects should be placed before the Government and there must be no hesitation or filling and backing. The result of a lack of firmness might be disastrous and the work of the last four years thrown away.

I am saying all this for the purpose of fortifying you against uncertainty and also for the purpose of giving you the right point of view in

deciding whether you will ultimately accept the Chairmanship. It may be proposed, and there are some who have suggested it, that the Chairman shall also be the Director of the Institute. That would be acceptable if you were the one taken but it would be difficult after your time to find a successor who had the right qualifications for both positions. In any case, the Chairmanship will be continued and the salary given what it is now. There will, of course, be some disadvantages attached to it but these, for a person of your age, will hardly count.

I would, therefore, urge you not to feel that the future status of the Chairmanship of the Research Council is doubtful. It will always be a position of prominence and activity. From my experience I can understand that a younger man would find in it very many attractions and interests and be quite satisfied with it. I could not do so because I came too late into it and with too strong a pull towards a life of private research, which counts for everything with me and will do so to the end.

I am finding the work in McGill very attractive, the official duties very light, and hope that by this time next year everything will be thoroughly organized. I am going to China about the end of February under the auspices of the Rockefeller Foundation, to give some advanced lectures in the Peking Medical School and to advise concerning the organization of the latter. The Foundation asked the McGill Medical Faculty to give me leave-of-absence, which had been generously accorded. . . .

TO A. B. MACALLUM FROM A. S. MACKENZIE, HALIFAX, 24 NOV. 1920

. . . I further, as you well know, do not think it would be at all wise to have the Administrative Chairman of the Council the Director of the Research Institute. The latter position is one that will take all the time and all the energy of one man, and though he requires great organizing and administrative ability to carry on that position successfully, yet, I think, his chief qualification is that he already have undertaken the administration of organized research and have had a successful experience in it.

I am deliberately holding up the matter of coming to a decision. . . . I feel sure you will agree with me that it is the part of wisdom to wait until after the turn of the year, when the whole question will resolve itself into its real form and proportions, before trying to come to a decision. . . .

TO A. S. MACKENZIE FROM A. B. MACALLUM, OTTAWA, 23 DEC. 1920

. . . During the meeting Mr. Lloyd Harris went to see the Premier, who told him that legislation would be introduced at the coming Session

of Parliament establishing the National Research Institute, but that it must meet the wishes of Mr. Hume Cronyn in every respect. . . .

The only problem which raised difficulties was introduced by Mr. Lloyd Harris and this was as to what the Chief Administrative Officer of the Council should be. He thinks that the Council should be like a business organization, with an Honorary Chairman and a Manager or Director, just as in the case of a Bank Corporation. This Administrative Officer would have charge of all the correspondence and bring up everything before the Council for its decision. He would not have a vote but would be a highly trusted official with special technical qualifications which would permit him to advise upon very many of the questions coming before the Council. The Honorary Chairman would be a member of the Council, selected for the time being and perhaps with several years to run as presiding officer. Some members of the Council approved of this proposal. At first it looked to me quite all right but the question of salary and the qualifications demanded led me to review the situation and I am doubtful if such an officer can be obtained. You could not, I think, get one for less than $8,000 or $10,000 a year, who would be content to be an officer only, not like myself in the present position with a vote in the Council. The matter was not settled. . . .

There has been no proposition so far to combine the office of Administrative Chairman and the Directorship of the new Institute. It is probable that this matter may be discussed at the coming meeting. . . .

RELATIONS WITH GOVERNMENT: THE CABINET

TO J. C. MCLENNAN FROM A. B. MACALLUM, OTTAWA, 27 JULY 1920

. . . There was no appropriation in the Supplementaries for the National Research Institute. Several reasons were given for this. One was that the Budget already was enormous and on this account the Cabinet made every effort to cut down in every item. . . . Another reason advanced was that it was too late to get anything done. . . .

The plans for the buildings, it was held, could be just as readily drawn up in a few weeks next autumn and paid for from the funds at the command of the Council from its regular vote.

Sir Henry Drayton, Sir George Foster and several other members of the present Cabinet are very staunch supporters of the proposal to establish this National Research Institute and some of these assure me that there will be no doubt about its establishment next Session.

There is nothing being done regarding the cement problem. The Committee in the West has not yet brought any proposal except that the Council shall furnish $10,000 and the Cement Company of Canada $5,000 each a year to promote this research. The Canada Cement Company, Mr. Jones, the Manager told me, will balk at this end and it is hardly possible that the Research Council will give such a large vote at once at least for a proposal which is in quite an inchoate form.

The tar sands business stands because a private Company headed by General Lindsay has leased a portion of these deposits and has established a plant to make oil as a substitute for gasoline as well as other products.

The low grade iron ore proposition is also where it was. The Council can make a large appropriation for this but the difficulty is to get it carried on or undertaken by anyone qualified for it. . . .

TO SIR GEORGE GARNEAU FROM A. B. MACALLUM, OTTAWA, 31 JULY 1920

. . . Mr. Meighen has been, I judge, the victim of the representations of certain subordinates who are anxious to aggrandize themselves and who would like, therefore, to take up functions for which they are not fit, especially the supervision of research. It is one of the absurdities of the day that anyone, even a fool, thinks he can guide research.

TO HUME CRONYN FROM A. B. MACALLUM, OTTAWA, 27 NOV. 1920

. . . There has not been much done in crystallizing the situation regarding the National Research Institute. The Premier has been away from Ottawa up until a week ago and there has been only one meeting of the Research Council since that held in September, when he assured it that a start would be made in the foundation of the Institute at the next Session of Parliament. His Excellency, the Governor-General, however, came out strongly on this subject in an address on "Research" delivered at the inaugural meeting for the year of the Royal Canadian Institute, at Toronto. . . . This action on his part will not be without its effect. He is keenly interested in promoting the foundation of the National Research Institute and I shall bring to the attention of Mr. Meighen, confidentially, what he said on that occasion. . . .

TO LLOYD HARRIS FROM A. B. MACALLUM, OTTAWA, 19 FEB. 1921

. . . I think that the Bill will go through. This must postulate that the members of the Council must work together unitedly. Divided opinion

may prove disastrous and I am afraid that Professor McLennan with his tendency to impulsiveness may prove unwittingly to be a detonator of an explosive situation. Already there are members of the Civil Service here who are alarmed because they think that possibly their own Department will be affected. An interview with the Council was given some of these representatives today and it was pointed out that the Council had no desire whatever to venture over into their bailiwick. Perhaps they are unduly alarmed because of the decisive action taken by the Conservation Commission but the Council does not desire to have anything to do with any of the *routine* laboratories at present in the various Departments of the Government such as the Food and Drugs Laboratory, the Customs Laboratory and certain Laboratories attached to the Mines Branch. These must remain outside of the Institute as they are routine and it would be exceedingly unwise to have routine work except in determination of standards put in the Institute. This, I hope, will sink in to the staffs of those Laboratories. . . .

TO A. S. MACKENZIE FROM A. B. MACALLUM, OTTAWA, 19 FEB. 1921

. . . the National Research Institute is to be founded by legislation during this Session of Parliament. In the speech from the throne there was a notice of the introduction of Bills on a number of topics including one on "Scientific Research," which Mr. Cronyn, who has charge of all this matter on the political side, says means the establishment of the N.R.I. . . . He is intensely interested and is going to throw a good deal of energy and political strategy into the matter. He is very safe and the ultimate result will be, I think, all that we *can* get from what we demand. . . .

Nothing has been done yet in the way of the selection of the Chairman. There is a proposal now to appoint a purely Honorary Chairman with a Director or Manager-Secretary to attend to all the business of the Council, to bring forward at its various meetings the matters under way and to be discussed. Whether this will be accepted or not I do not know. I am rather dubious as to the value of the proposal. It seems to me that the Chairman of the Council in the future should still be Administrative because he must be on the go all the time to organize the various Trade Guilds for Research which will require considerable amount of diplomacy and insight to bring about. I am doubtful if we could get a Director or Managing Secretary who would have the weight that such a Chairman should exercise along this line. If the Chairmanship is continued as at present, I think you are the only logical man for it.

Someone will carry on in my place as Administrative Chairman. Dr.

Ruttan has been mentioned for it and indeed the trend of opinion is strongly in favour of this. . . . it will only be for two or three months and until the Bill has passed through the House. . . .

. . . I shall have three weeks' rest on the ocean going and another three weeks coming, the first real rest in seven years, and I expect to come back with an exceedingly rosy and optimistic view of life, to settle down as an ordinary member of the Council and watch my colleagues doing their work. At McGill things are moving very nicely. Sir Arthur Currie is doing exceedingly well. The spirit there is excellent and I have had a splendid welcome. I hope next Session to have a lot of time to myself to indulge my hobbies and tastes in a fashion that cannot be remotely indulged in now. . . .

RELATIONS WITH GOVERNMENT CONTROL AGENCIES

TO C. JAMESON (CIVIL SERVICE COMMISSION) FROM A. B. MACALLUM, OTTAWA, 20 JAN. 1920

On the Supply of Efficiently Qualified Technologists in Canada

The Research Council, three years ago, instituted a questionnaire census of Canadian researchers and thereby obtained data regarding the supply of those available at that time. The number, as ascertained, was alarmingly low. There were less than one hundred, a considerable number of whom were only moderately qualified and had not achieved any very marked distinction in their training and work, and there were less than fifty, all told, who could be considered as having research qualifications of a superior type, the majority of whom were in the Universities. There were found to be a large number of routine chemists, mineralogists and technical men who were qualified enough to carry on, but who had not had any opportunity of showing, or who had not shown, whether they had the initiative and capacity for research. This latter, of course, is not a common qualification, even amongst men who devote themselves to technical scientific work.

Canada has produced a considerable number of highly qualified researchers, but many of these have been attracted to careers in the United States. In consequence of the scarcity of such scientific men in Canada, the Research Council has been hampered at every turn in its efforts to encourage scientific work and, especially, in relation to new projects in the development of our natural resources.

Several of the investigations for which the Council made grants have failed because of the lack of such researchers to carry on these investigations, one of which may be specially referred to by way of illustration. There is near Fort McMurray, in Northern Alberta, a deposit of tar sand extending over 1,500 square miles and of about from four to ten feet thickness throughout that area. The tar amounts to about 10% at least. This tar, if its separation from the sand could be economically carried out, would be of enormous value to road-making, etc., in Saskatchewan and Alberta.

The Council, three years ago, made a grant for the purpose of carrying on, under a staff of engineering chemists and engineers, an investigation looking to a cheap process of separating this tar on a large scale. It was to be undertaken under the supervision of President Tory of the University of Alberta. The project was not carried out not only because President Tory went overseas, but also in the main, because there were no properly qualified engineering chemists and engineers available, who could be enlisted and engaged in this work. Since then the project has not been advanced simply because of the lack of those qualified to undertake it.

As regards the supply of efficiently qualified technologists and researchers, Canada is in a most unfavorable position as compared with the United States. The membership of the American Chemical Society, which, of course, includes routine chemists as well as researchers, is at present over 13,000. In comparison therewith Canada has not 300 chemists of the rank of the average membership of the American Chemical Society. . . .

The salaries paid in the United States to technologists of great research ability are such as to enlist their services, and British, German, French and even Italian researchers are now employed in considerable numbers in the United States. The Director of one of the largest research laboratories there, that of the Eastman Kodak Co., of Rochester, is an Englishman* of somewhere about forty years of age.

As regards geologists, mineralogists and metallurgists, the number in Canada is far below the demand, in part because too few have been trained as such during the last ten years and in part because mining and oil companies, British and American, have enlisted in their services very many of the best of such available.

In the scientific departments of the Civil Service of Canada it is urgent that efficiency should be aimed at, *otherwise there is no justification for the Government of Canada attempting to carry on scientific*

*Dr. C. E. K. Mees, author of *The Organization of Industrial Scientific Research* (New York: McGraw-Hill, 1920).—M.W.T.

work. It is a waste of money to pay salaries, even if they are low, to technologists who have the minimum qualifications. As I pointed out to the Committee of the Senate, when considering the Civil Service Bill, the effect of low salaries will ultimately be *the staffing of the scientific departments of the Government with mediocrities, or worse than mediocrities.*

Technologists of ability and distinction will not remain in the Civil Service, if the salaries are not sufficient and the promises of advancement attractive. The salaries in the Civil Service need not be as high, or nearly as high, as those offered by private corporations and firms, for a technologist will be satisfied if the salaries are like those in the Universities, but moderately high, and if, also, the chances of promotion, because of steady work and of distinguished research, are good.

There has been hitherto a distinction attached to a post in the scientific service of the Government, a distinction which, in the past, served to make up for the difference in the salaries given by the Government and the salaries given by an industrial firm or corporation.

I may add that the Research Council has endeavoured to increase the supply of scientific men of the desired kind by instituting Bursaries, Studentships and Fellowships. . . .

This is an indication of what Canada has to face, a difficulty that is not properly appreciated by all those who should be concerned about the scientific development of industry in Canada.

This difficulty and what it involves has, I think, not been adequately appreciated by the Experts engaged by the Civil Service Commission to classify the Civil Service when dealing with the classification, and the scaling of the salaries, of the members of the Scientific Departments.

RELATIONS WITH GOVERNMENT DEPARTMENTS

TO J. J. R. MACLEOD FROM A. B. MACALLUM, OTTAWA, 7 JUNE 1920

I have your letter of June 3rd . . . on problems of industrial hygiene in Canada.

I am going to consult with Col. Amyot, the Deputy Minister of Health, on the subject and to determine what is to be the relation of the Associate Committee on Industrial Hygiene to the Department of Public Health. It is necessary to regularize our bearings because there is so much

talk here of overlapping of effort and of one Department encroaching on another. . . .

TO COL. J. A. AMYOT FROM A. B. MACALLUM, OTTAWA, 10 AUG. 1920

At the last meeting of the Research Council . . . the following resolution was adopted:—

That whereas the Associate Committee on Industrial Fatigue was constituted before the creation of the Federal Department of Public Health and whereas the problems engaging the attention of this Committee properly lie within the purview of the said Department,

It is resolved that the Research Council. . . is of the opinion that, after the expiration of the present fiscal year, the investigation in connection with Industrial Fatigue should be carried out by and under the Department of Public Health, and that the Department be advised to that effect.

The appropriation already made by the Council for carrying out the work of this Committee will suffice to meet its expenses until March 31st, 1921. If the Committee is to proceed further on its work it should be, as I have already pointed out to you in conversation, under the auspices of the Department of Public Health of the Dominion Government, which should also make provision to meet the expenses which will be involved in carrying on this work further, and if the Committee is to investigate the problems of industrial hygiene, on a more extended scale.

TO A. B. MACALLUM FROM COL. J. A. AMYOT, 12 AUG. 1920

You are not so smart as you think you are.

TO COL. J. A. AMYOT FROM A. B. MACALLUM, OTTAWA, 16 AUG. 1920

I beg to acknowledge receipt of your letter of August 12th which is apparently in answer to my letter of August 10th.

It is not in the public interest that a letter like yours should come from a Government official however highly placed he may be.

I am, therefore, placing copies of the letters before Sir George E. Foster, Chairman of the Sub-Committee of the Privy Council for Scientific and Industrial Research for his consideration and action thereon.

TO THE RT. HON. ARTHUR MEIGHEN FROM SIR GEORGE E. FOSTER, OTTAWA, 21 AUG. 1920

I am transferring to you herewith a copy of brief correspondence carried on between the Honorary Advisory Council for Scientific and

Industrial Research, of which Dr. A. B. Macallum is the Chairman, and the Deputy Minister of the Department of Health. . . .

. . . To this letter Col. Amyot replied on August 12th in a manner which appears to me to be uncalled for and which in my opinion requires a prompt and satisfactory explanation.

It will be practically impossible for Government Departments to carry on their work if such a tone as that assumed by Col. Amyot is allowed to be given to such correspondence. . . .

RELATIONS WITH UNIVERSITIES

TO W. C. MURRAY FROM A. B. MACALLUM, OTTAWA, 24 MAY 1920

. . . I agree with you that, for the future, the applications for Fellowships and Studentships should be all in the hands of the Administrative Chairman at some definite date in the year. At present they are supposed to be received in the last three months of the academic year, that is, during the quarter, April to June. The regulations at present in force may be abused and I am afraid of a scandal. The Council so far, against my protest, has been awarding these Studentships and Fellowships as the applications have come in, whereas there are a large number of holders of Studentships now who are not expected to report before the end of June and whose reappointment for next year may be precarious because of the fact that so many have already been awarded that few are left of the allotted number.

Prof. McLennan has already got four out of ten Fellowships and only one of these has served in a Studentship. This leaves only four Fellowships to be awarded amongst the most meritorious of the fifteen who have held Studentships. This situation must not be repeated next year. . . .

TO W. C. MURRAY FROM A. B. MACALLUM, OTTAWA, 4 JUNE 1920

. . . It seemed to me necessary to have a frank talk in regard to some questions which the Council has been dealing with, I think, too lightly; that of the Fellowships, for instance. It does not seem to me that the members are taking the matter of appointments to these, and the Studentships and Bursaries, as seriously as they ought. These Fellowships and Studentships can only be justified if the appointments to them happen to turn out to be of the right sort. When a member* comes to urge that,

*Professor J. C. McLennan.—M.W.T.

on account of other considerations than those of ability, certain students of his should be awarded Fellowships rather than Studentships and the Council assents, the situation is awkward. He, of course, thinks that all his geese are swans whereas, if I read character aright, some of them are but ordinary people, never likely to go very far except when pulled forward by the nose. I might mention further that students cannot be made into independent researchers by being given a piece of work and guided through it every step by the head of the Department. . . .

I am glad to hear that Chase* is taking action with regard to alkaline waters on concrete and that we shall get some program from him shortly.

RELATIONS WITH THE PRESS

TO A. B. MACALLUM FROM L. E. WESTMAN (CANADIAN CHEMICAL JOURNAL), TORONTO, 27 NOV. 1920

. . . is the Government prepared to allow matters regarding the Research Council to drag along indefinitely? If you could keep us posted as to general movements or specific developments, it would be considered a very great favor.

TO L. E. WESTMAN FROM A. B. MACALLUM, OTTAWA, 6 DEC. 1920

. . . One of the qualifications of the Premier† is that he is courageous and honest and will not hesitate if he thinks a good case can be made out for his taking a line of action such as this. Although last June he opposed the making of a grant to provide for the construction of the buildings required for the National Research Institute proposed by the Council, he decidedly informed the latter body at its meeting in September last that a start would be made in the establishment of this Institute by the introduction of legislation thereon next session. . . .

The only uncertainty I feel now is about the control of this Institute. If it is put under the Civil Service Commission it will die prematurely or be ineffective as so many Departments of the Government are. The Council wishes the Institute to be put under its own control, either constituted as it is now or changed somewhat if that is necessary. The Civil

*A consulting engineer of the firm of Smith, Kerry and Chase.—M.W.T.
†The Right Honourable Arthur Meighen.—M.W.T.

Service Commission could not make appointments or determine the policy of such an Institute nor could a staff of the same, and a Government Department would entail the results such as you have seen in the past. It would be better not to establish such an Institute than have it controlled by a Department and its appointments made by the Civil Service Commission. The Research Council could be constituted a Civil Service Commission for such an Institute and it should be responsible not to any one Department but to the Cabinet as a whole. This is the situation in England, where the Department of Scientific and Industrial Research, which controls all research work undertaken under the Imperial Government, is responsible to the Privy Council only. . . .

I hope you will endeavour in the Canadian Chemical Journal to support the proposal that the new National Research Institute shall not be put under any Government Department and that it be under the control of the Research Council, responsible to the Cabinet as a whole. . . .

1921 · *The Second Chairman*

"Dreadful things are just as apt to happen
when stupid people control a situation as when definitely
ill-natured people are in charge."—Don Marquis

"Reason's weakness is the belief that it has the
capacity to convince unreason."—Jean Rostand, 1962

MACALLUM'S REIGN as administrative chairman was followed by a sort of musical chairmanship, in which three of the founding members succeeded each other at intervals of several months. All three were referred to as "Honorary" chairmen, to indicate that their duties were part-time only, and all were allotted modest honoraria (1, 2, 3). The second administrative chairman was R. F. Ruttan, Director of the Department of Chemistry at McGill University, who presided from 19 February to 18 August, 1921.

In 1921 the Council awarded a grant to assist with research on the effects of alkaline soils on concrete. This, like the wheat-rust investigations, was destined to become a really important major achievement of Canadian science.

In the spring of 1921, the Meighen government at last introduced a bill to amend the Research Council Act and to establish a National Research Institute (4). The government spokesman for the bill was Sir George Foster. He gave an eloquent, lengthy review of the work carried on by the Advisory Research Council. He pointed to the extensive research laboratories of American corporations, and observed that the United States government had also established "a well equipped and extensive laboratory and bureau of standards and research in the vicinity of Washington and is carrying on, on its own account and in cooperation with manufacturing industries, extensive research in almost every branch of

production, even down to domestic economies" (5). Furthermore, the United Kingdom government had appropriated one million pounds to assist various guilds and associations in scientific and industrial research. Foster added:

> Now, the institute which it is proposed to establish in Canada will run something along those lines. That is its object will be, in the first place, to establish standards for weighing, measuring and otherwise judging materials used in industry and commerce, and to extend the knowledge and use of those standards. It will conduct researches itself, independently of guilds or associations of outside industries. In addition, it will equip a laboratory to a certain extent, and will throw that equipment and that facility open to associations and guilds in industries who then provide their own funds and their own researchers. . . . (5)

The proposed legislation envisaged a National Research Institute in Ottawa, whose staff would consist of a director, and various other scientific, technical, and clerical personnel. The institute was to have charge of researches undertaken to promote the utilization of natural resources in Canada, and researches to discover or improve technical processes used in industries. The director of the institute was to be an agent of the Advisory Council, whose membership would be increased from 11 to 15.

Under another amendment of the Act, the Advisory Council was to report to the Minister of Trade and Commerce rather than to a subcommittee of the Privy Council. According to Sir George Foster, this would be merely a change of law in conformity with established practice:

> A sub-committee of council was established under that Act, composed of myself as chairman, and three of my colleagues. It was thought that it would be useful to have this matter carried out under the auspices of such a sub-committee as the body to which the advisory council should apply, and from which it could get the approval of its measures. As a matter of fact it has been found impracticable to carry the work out in that way. You can get meetings of the Cabinet with reasonable regularity of attendance, where you have the interests of the whole to be looked after; but when you make a sub-committee stand in the place of the minister with reference to a branch of work being carried on under him, practical difficulties arise. It works out in the end to this—the chairman of the sub-committee must take the responsibility and in the main must carry on the work. So much delay is caused in getting together the members of the sub-committee that it keeps back all the work of the depart-

ment, and if you adhere to that method absolutely it is very difficult to make progress or to have satisfactory administration. Therefore it is proposed to put the Advisory Council under the charge of a minister—The Minister of Trade and Commerce—with the usual reference to the Governor in Council, I think that will have the effect of making the administration much more easy and satisfactory. (6)

The bill to amend the Research Council Act and to establish a National Research Institute was passed in the House of Commons after much debate. The Hon. Charles Murphy (Member for Russell), who had been Secretary of State under Laurier,* led the opposition, arguing that the institute would duplicate existing facilities, and that the cost was exorbitant, "in these days of deficits that occur from day to day and keep on careering skywards" (7). Murphy and others doubted whether government research would produce significant results. However, Hume Cronyn gave a passionate defence of the bill. Macallum told Ruttan that "A word of commendation from men like Fielding, Manion or Nicholson is worth a eulogy of a thousand words from Murphy."

While the bill to found the National Research Institute was being pressed through the House of Commons, McLennan reverted to his old conviction that the site should be in Toronto—to the disgust of all the other founding members who thought that that battle had long ago been decided in favour of Ottawa.*

The Engineering Institute of Canada were opposed to the bill,* perhaps remembering the stinging comment made by Macallum two years previously, on the occasion of Challies' farewell gathering: "Engineers should be on tap but not on top" (8). It is surprising how much animus can be developed, of a most enduring kind, by such a statement. It would probably have amused such engineers as C. D. Howe or C. J. Mackenzie, both of whom knew better; but most people do not take kindly to professional derogation, especially in a witty and quotable form. Macallum's addiction to the Shavian pose sometimes interfered with his progress.

Opposition also came from the scientific services of the civil service who were violently opposed to the bill but who received a very cool reception from members of parliament, except from the Hon. Charles Murphy.

The disquieting clause that made it possible to take any scientific

*Document quoted in this volume.

work away from the service and place it in the institute was vigorously attacked,* but without effect; the bill was passed. Because of this opposition, Macallum took "peculiar satisfaction" in the passage of this particular clause.*

The Council, greatly relieved, settled down to the attractive problems of choosing a director, choosing a site, and deciding what sorts of persons would be best to fill the four new vacancies on Council. They were sure that the battle had been won at long last and that they were now at the beginning of a fruitful endeavour.

They forgot about the Senate. There is no documentary evidence that their opponents in the civil service, having failed to influence the government side of the House of Commons, had quietly gone to work on members of the higher court. But the emotional evidence suggests something of the sort. Other factors may well have been at work but, at any rate, the bomb was dropped and the bill was defeated in the Senate. There would be no National Research Institute. The excuse given was that, after a war, money should be carefully preserved and not spent on new things.

Even A. S. Mackenzie, whom all agreed was certainly the most reasonable member of Council, could not help wondering if senators—"a lot of old blathering idiots"—could possibly be so stupid without considerable assistance.* The general impulse was for the Council to resign in a body, but this was resisted.*

The proposed amendments to the National Research Council Act were of course defeated at the same time, including Foster's suggested amendment to have the Council come directly under the Department of Trade and Commerce. The NRC therefore continued to operate under the Sub-Committee of the Privy Council on Scientific and Industrial Research, set up for this purpose in 1916.

REFERENCES

1. Min. 34, Proceedings, 42nd Meeting, NRC, Sept. 15, 1921.
2. Min. 19, Proceedings, 49th Meeting, NRC, Oct. 13, 1922.
3. Min. 15, Proceedings, 54th Meeting, NRC, June 11, 1923.
4. House of Commons Debates, April 26, 1921, p. 2566.

5. Sir George Foster, House of Commons Debates, April 28, 1921, p. 2690.
6. *Ibid.*, p. 2691.
7. Charles Murphy, House of Commons Debates, April 28, 1921, pp. 2692–93.
8. Verbal, J. B. Challies to M. W. Thistle, March 1961.

DOCUMENTS

TO A. B. MACALLUM FROM R. F. RUTTAN, OTTAWA, 15 APRIL 1921

. . . After numerous meetings and discussions, the Bill I am sending to you now has about reached its final stage. I think I sent you the proposed alterations of the Civil Service employees, to which, of course, we have paid no attention, but I have had several interviews with them and doubt very much whether I have made any great impression. The situation is obviously this: A large number of them feel that their activities should be part of the Research Institute and are doubtful whether they are up to the standard which we would require for men engaged in that type of research. I find the senior men very reasonable. Mr. Hume Cronyn addressed the Ottawa Branch of the Engineering Institute of Canada at a luncheon yesterday in the Chateau Laurier. They sent me an invitation, but I could not possibly leave Montreal, as I had been here from Thursday of last week until Tuesday evening. There is no doubt that they are making a strong fight to defeat the formation of an institute.

We had our first meeting of the Council on Friday and Saturday of last week. . . . I had prepared for them a draft of the Bill, to which I had attached every suggestion, alteration and amendment made by the members of the Research Council, the Toronto Board of Trade and the Manufacturers Association. Most of these were found to be valuable and were incorporated in the draft which I am sending you.

There is a strong agitation in favour of having the Research Institute elsewhere than in Ottawa. Dr. McLennan and Mr. Lloyd Harris are very active in their opposition to Ottawa. They had meetings with the Toronto Board of Trade, at which having the Institute in Ottawa was strongly opposed. I saw Sir George Foster and Mr. A. K. MacLean and others, who expressed the opinion that it would be impossible to have it anywhere else than in Ottawa. The Council were in favour of having it in

Ottawa, with the exception of the two above mentioned, but I would not call for a division on the question, and we agreed to see Sir George and discuss the matter with him; so Mr. Lloyd Harris, Dr. Adams and I saw Sir George, who said that the matter had better be left to the Privy Council. Hence, you will notice that there is a blank at the beginning of the Bill to be filled in by the Privy Council. I do not think there is any doubt as to their decision.

We voted $5000 for the assistance of the research on the decay of cement. . . .

. . . The Special Committee of the House appointed to investigate scientific research are meeting this afternoon, and are meeting a Committee of the Civil Service who are engaged in scientific work. This Committee will probably consist of officers of the Civil Service Institute, —probably the same ones whom I have had see me in connection with the Bill.

I will add a few lines to this letter tomorrow after I hear from Mr. Cronyn as to the result of the meeting this afternoon. This Civil Service organization is the most opposition we are going to have to the Bill.

I have every reason to believe that the Honourable Charles Murphy will hold a brief for the Civil Service in the debate which will take place on the Bill.

Mr. Cronyn convened a meeting of the original Committee appointed to investigate scientific research, and discussed with the Civil Service employees, their objections to the Bill. I am enclosing a copy of a letter which they are sending the Premier and to Sir George Foster. I hoped they would modify this, as when I went over it with them, over a week ago, clause by clause, I did not seem so keen about supporting it. They presented the letter unchanged to the Committee. As a result of this interview, a special committee made no changes or suggestion of changes in the Bill. Mr. Cronyn says they had some sympathy with them in connection with Sub. Section 15, and it is just possible that this may be modified later. . . .

TO R. F. RUTTAN FROM A. B. MACALLUM, PEKING, 5 MAY 1921

. . . I am greatly surprised at the pretensions of a certain class of the Civil Servants in Ottawa. They assume that no change shall take place for the Country's interests except when their interests are preserved.

It is perfectly preposterous for them to claim to have representatives on the Research Council—in effect the granting of their claim would establish the Soviet system in scientific work there at once. Of course they have not thought out what they are proposing. Four representatives

on the Council from the Educational Institutions for example! What Educational Institutions? And four representatives from the Technical Services of the Federal Government! What Services are technical?

Of course the Government and House of Commons would never for one moment think of giving to representatives of its own Civil Servants the privilege of determining how money should be spent for the National Research Institute. The industries of the Country, moreover, would not tolerate the government of the National Research Institute as set out in their amendment to the Bill.

Further, their amendment to Section 9 of our Bill involves the claim on their part that the Government shall not have the power to put into the Institute any Scientific work related to any one Department unless the Minister of that Department approves. Do they not recognize that, even if this Clause 9 is so amended, the Government could use the Act of 1919 (?) which gives the Governor and Council the power to transfer the work of one Department to any other Department or to any other Organization and thereby do what Clause 9 as we drafted it was provided to do? The chief value of Clause 9 is that it indicates very clearly to all concerned what may be done in connection with the Research Institute by the Governor and Council and in accordance with Act of 1919 (?).

I was afraid that such preposterous proposals would be put forward by certain Civil Servants and I warned Mr. Cronyn thereon. I pointed out in a letter to him that they would hold the whole thing up if they could. Even Mr. Challies stated that if they did not get their way they would canvass the members of the House of Commons against the Bill. Has it come to such a pass that Civil Servants can block highly necessary legislation simply because they have not been accorded the claims, wholly exaggerated, that they put forward?

I have written to Sir John Willison who is in touch with the Canadian Manufacturers Association and the Canadian Industrial Reconstruction Association warning him that such moves on the part of the Civil Servants would be made. I fancy that both he and Mr. Cronyn are already on their guard. I believe that they will take such measures as will neutralize all these mischievous efforts on the part of the Civil Servants. . . .

I have great faith in Mr. Cronyn's influence. . . . I notice in a speech he delivered during the discussion of Dr. Manion's* motion on the development of the national resources of Canada that he emphasized the necessity for the establishment of this National Research Institute. I think he will keep at it and the Government will find it necessary to

*The Hon. R. J. Manion, P.C., later Minister of Soldiers' Civil Re-establishment, Sept. 21 to Dec. 29, 1921.—M.W.T.

concede pretty much what he demands. I am feeling easy in my mind on that side of the subject.

I am not, however, so easy with regard to the Council. I am afraid that one or two members will attempt to play off their own bat and in consequence Mr. Cronyn may not get the wholehearted support of the Council in his efforts to get the Bill accepted by the Government. It is disheartening to think that at critical moments the judgment of certain members on whom one should be able to rely may utterly fail. I think you know to whom I am referring.*

Nevertheless I am greatly in hopes that the whole thing will go through in spite of the opposition of certain Civil Servants and the lack of loyal cooperation on the part of others. . . .

TO R. F. RUTTAN FROM A. B. MACALLUM, PEKING, 9 MAY 1921

. . . the Bill has passed all the shoals and rocks, thank God. I congratulate you on the result and also the Council on the consummation of its four years of hopes and efforts. . . .

P.S. Considering what Mr. Cronyn has done to bring about the consummation of all our efforts and considering also the knowledge which he has gathered regarding the development of Research Organizations elsewhere and his position as manager of a great loan Corporation, it would be a splendid thing to have him as a member of the Council, that is one of the four additional members provided for by the Bill. Could you not have this discussed by the Council and a recommendation made by it to Sir George Foster? I would write to him directly but I do not like to butt in as all advice on this subject should be given by the Council as a whole and not by individual members.

TO LLOYD HARRIS FROM R. F. RUTTAN, OTTAWA, 11 MAY 1921

. . . Sir George is very fully convinced that we ought to have one representative from the Civil Service, so as to connect up our activities with those of the Scientific Branches of the Civil Service, and thus to aid in bringing about coordination of effort. There is one outstanding man in the Service concerning whom none of us would have any objection, and that is Mr. Camsell, Deputy Minister, Dept. of Mines, but there is no one of the Council as well able as yourself to suggest men from the industries who will be of strength to the Council at the present time. . . .

*Professor J. C. McLennan.—M.W.T.

TO R. F. RUTTAN FROM A. B. MACALLUM, PEKING, 15 JUNE 1921

I was greatly relieved when I received the Hansard report of the discussion in Committee in the House of Commons on the Research Institute Bill. I congratulate you and all the members of the Council on this result. I note with peculiar satisfaction the inclusion of the Clause, slightly amended, giving to the Governor and Council the power of determining what work at present carried on by Government Departments or Government Commissions may be included in the function of the Research Institute. This clause is doubtless resented by those who have opposed giving the Governor and Council such powers but it is absolutely necessary if there is to be anything like economy of effort and expenditure on scientific work under the Dominion Government.

I suppose you . . . are now much engaged on the question of site and type of building and choice of the Directors. . . .

. . . Dr. Stanley Mackenzie . . . might fill the position with great acceptance. He is, it is true, not qualified in the way of Chemistry but he has, as a physicist, a standing which ought to count. Further, he is a diplomat, and knows how to manage people to obtain his ends. Dalhousie perhaps would not care to let him go but he might think it worth while to get into the larger arena.

I suppose, however, McLennan regards himself as eligible for this position and may resent his being left out but he lacks tact and would doubtless make a great many enemies. His judgment also is very poor. He is extremely energetic and is experienced along the various lines of research in physics.

These observations may, however, come too late as when you read this your selection for the post of Director may possibly have been made. . . .

P.S. Just received a copy of the Act as it passed the H. of C. May 3rd. Very satisfactory on the whole.

TO R. F. RUTTAN FROM A. S. MACKENZIE, HALIFAX, 14 JUNE 1921

. . . What did you do at your last meeting? . . . I must say that I feel like giving the whole thing up, and yet it seems a pity to allow a lot of old blathering idiots in the Senate to stampede us. I read the debates, if they can be called such, in the Hansard, and I think that I never had an opportunity of reading such unadulterated twaddle as that was. As an exhibition of incompetence, and ignorance, and inability to grasp a thing which was laid before them time and time again, I think this

constitutes a record. I could not help but wonder whether there was something back of it, and whether Lougheed did not look with at least equanimity on the death of the bill. Do you think there was anything in the way of a put up job to save the Government's face this year? If you get a moment, I shall be very glad if you will tell me just what has happened.

TO R. A. ROSS FROM R. F. RUTTAN, OTTAWA, 22 JUNE 1921

. . . I am very much put out over the difficulty of obtaining action in connection with the reorganization of the Research Council. As Sir George is Acting Prime Minister, he has been out of town a great deal, and, when he has been here, I have found it practically impossible to obtain an interview with him on the Tuesday, Wednesday and Thursday when I am in town. I have written him several letters and asked for approval of our expenditures; up to date, I have received neither replies to my letters nor approval of our expenditures. He has now left Ottawa for a week. His Secretary tells me that we cannot count on his return before the first. I am very glad he is having a few holidays, as I think he has been very much overworked, but, in the meantime, we are getting no action so far as the affairs of the Council are concerned. I have had to sign one cheque today for a little grant of $300 to Louis Simpson, as he has been in the field now for ten days without the apparatus for which he asked us.

I have been obliged to notify the holders of Studentships, etc. that we have not yet received the approval of the Sub-Committee of the Privy Council for any expenditure and could only notify them that the Council had recommended them for the Studentship or Bursary.

I intended to remain here for two or three days this week expecting to be able to clear up matters with Sir George and to hand over the cares of office to you and Colonel Gaudet. . . .

In a letter from Mr. Lloyd Harris which I received yesterday from Fort Worth, Texas, he strongly advised the resignation, as a body, of the whole Research Council. I wrote explaining the reasons why we did not resign, and also explained to him that we felt very much inclined to do so.

TO A. B. MACALLUM FROM R. F. RUTTAN, OTTAWA, 14 JULY 1921

. . . As a vote of confidence to the Council, and, as a reprimand to the Senate for its absurd action, the supplementary estimates contain an appropriation of $100,000 towards a Research Institute. It does not

seem at all likely that we can utilize any portion of this for building purposes or for us to definitely secure a Director. I had several consultations with Sir George and one with the Premier, and, although Mr. Hume Cronyn is inclined to advocate definite steps being taken and a certain portion of the $100,000 utilized for the next session, Sir George is of the opinion that it would prejudice the Council in the eyes of the Senate next session, if any money should actually be spent, so, what we purpose doing is to make further negotiations regarding the Director, and to secure a site. Such site might be used by the Government afterwards for other purposes; hence, it would not be money expended directly for the purpose of the Research Institute. . . .

I am still in harness putting in a couple of days every week and doing a good deal of work in Montreal in connection with the Research Council, and I can assure you that I am most anxious to be relieved.

As I think I told you in my last letter, we decided to recommend to the Privy Council, that an Order in Council be passed enabling us to change our organization, making Ross Honorary Chairman, and appointing a Technical Executive Officer. Colonel Gaudet of Montreal is strongly recommended by Ross, Garneau, Surveyer and Adams, and he has been offered the position at $7000. In the meantime, owing to the absence of the members of the Privy Council, no Order in Council, enabling us to make this change, has been passed. Sir George has promised to bring the question up as soon as the representative group of Cabinet Ministers are in Ottawa. . . .

1922 · The Third Chairman

"Characterizations of scientists almost always emphasize the objectivity of their work and describe their cold, detached, impassive, unconcerned observation of phenomena which have no emotional meaning for them. This could hardly be further from the truth. . . . The truth of the matter is that the creative scientist, whatever his field, is very deeply involved emotionally and personally in his work, and that he himself is his own most essential tool."— Anne Roe, 1961

THE GOVERNMENT changed on December 29, 1921, with W. L. Mackenzie King as the new Prime Minister, and the Hon. J. A. Robb as Minister of Trade and Commerce and therefore Chairman of the Privy Council Sub-Committee on Scientific and Industrial Research.

The third chairman of the National Research Council was Dr. R. A. Ross, a consulting electrical engineer in private practice, whose official term of office was from August 19, 1921 to May 29, 1922. He resigned on March 4 and was succeeded by Dr. F. D. Adams as acting chairman for the remainder of that period.

Ross was aided by Colonel F. M. Gaudet as technical executive officer. Ross complained about having a headful of "altruistic futilities such as, propaganda, placation of this man or that interest —interesting support here and there,"* but Gaudet seems to have carried most of this load.* When the Hon. James A. Robb asked him: "Do the Misses C. W. Fritz and M. A. Fritz (holders of a Fellowship and Bursary, respectively, at the University of Toronto) belong to the same family?," Gaudet gave the justly deserved and

*Document quoted in the volume.

delightfully blunt answer: "Awards are made entirely on merit, and there is no information as to the relationship of the above."* Gaudet resigned in September of 1922 (1).

The "propaganda" mentioned by Ross as being uncongenial to him was nevertheless a duty of Council. In the "Plan of Work" given to the Council by Sir George Foster in December of 1916 (2) one item reads: "To inform and stimulate the public mind in regard to the importance and utility of applying the results of scientific and industrial research to the processes of production by means of addresses to business and industrial bodies, by the publication of bulletins and monographs, and such other methods as may seem advisable." A standing publicity committee was set up early in 1917 (3, 4), with Adams as convener. Now, in 1922, there was a sudden burst of activity.

About a hundred special articles were issued, and editorial support was received from fifty-nine Canadian journals including all the main newspapers. Special literature was showered on all the legislatures, boards of trade, chambers of commerce, business clubs, and professional organizations: as a result resolutions were passed by seventy-two public bodies supporting the Council and the establishment of a National Research Institute at the earliest possible date (5). But the institute was not to be so easily founded, and perhaps the most valuable effect of all this publicity was in keeping up the spirits of the members of Council.

Ross, in addition to being chairman of the National Research Council, was chairman of the Lignite Utilization Board. The scientific services of the departments regarded this board as a child of the Council, as indeed it was. The services, glorying in the defeat of the Council's "Institute" bill in the Senate, now happily proceeded to dismember the Lignite Utilization Board.* They were determined that all such governmental scientific and technical work would henceforth be done in the departments, and nowhere else.*

When Ross had thought this over, on the train returning to Montreal from Ottawa, it seemed to him that his best move was to resign immediately. Either it was indeed government policy to do all scientific work within the departments, even new industrial research aimed at secondary industry (in which case there was no point in the NRC), or it was not government policy at all but

simply a departmental desire, in which case the departmental bluff should be called. At any rate, Ross made a grand slam in resignations: he resigned his three chairmanships (of the Lignite Utilization Board, the Peat Board, and the National Research Council) and also resigned as a member of the Council.* Like an inverted Alexander the Great, he sighed for more worlds to relinquish. He bundled all these resignations into a single letter to the Prime Minister, hoping that this would at least call attention to the fact that all was not well in government research.*

The Research Council immediately urged the Prime Minister to retain the services of Dr. Ross as chairman of the lignite and peat organizations. They realized that he did not wish to continue as their own chairman but urged that he be retained as a member (6). However, Ross does not appear again as a member of Council, though he does continue to sign letters as chairman of the lignite board (7).

The Lignite Utilization Board, now totally without funds, was kept going by a loan of $20,000 from the National Research Council (8).

During Ross's term of office, the Forestry Branch of the Department of the Interior finally became strong enough to undertake research. The Council therefore disbanded its Associate Committee on Forestry and passed over to the department the Petawawa Forest investigations, which had been instituted by the Research Council (9).

REFERENCES

1. NRC Grants for Assistance to Research, list no. 44, item 105. National Science Library.
2. Exhibit A, Proceedings, 1st Meeting, NRC, Dec. 4, 1916.
3. Min. 30, Proceedings, 2nd Meeting, NRC, Jan. 5, 1917.
4. Min. 42, Proceedings, 3rd Meeting, NRC, Feb. 13, 1917.
5. Exhibit B, Proceedings, 47th Meeting, NRC, May 19, 1922.
6. Min. 6, Proceedings, 46th Meeting, NRC, March 10, 1922.

7. Appendix B, Report No. 28, Lignite Utilization Board, Oct. 15, 1923.

8. Progress Report No. 23, Lignite Utilization Board of Canada, April 3, 1922. National Science Library.

9. Min. 20, Proceedings, 42nd Meeting, NRC, Sept. 15, 1921.

DOCUMENTS

TO R. A. ROSS FROM F. M. GAUDET, OTTAWA, 4 FEB. 1922

Yesterday I had the good fortune of a conversation with Mr. J. E. Walsh, General Manager of the Canadian Manufacturers' Association, and have thus dispensed with the necessity of asking someone in Toronto to interview him, or having to go there myself. I have sent him 500 copies of the pamphlet ["Research and the Problems of Unemployment, Business Depression and National Finance in Canada," issued under the authority of the NRC] for distribution to their branches, from whom he has undertaken to get resolutions which will be addressed to the Government. As their members are also prominent on all Boards of Trade, they will be instructed to have similar resolutions passed by the latter. A meeting of the C.M.A. Executive will be held in Ottawa on the 22nd instant, and I am invited to make a short address at a lunch on that date, previous to their interview with the Government on the 23rd instant. They have promised to include the Research Institute on the agenda for discussion with the Ministry.

Tom Moore, the labour leader, will return on Monday, when I shall endeavour to have an interview with him, and I am hopeful that, with the help of the information available, he may be induced to taking steps similar to those outlined above, as regards the labour Organizations.

I have written to N. J. Lambert, Secretary of the Canadian Council of Agriculture, enclosing a pamphlet, but the farmers do not appear to be as well organized as the other interests. I am somewhat in doubt as to the best method of approach, and should appreciate your advice. Mr. Walsh thinks that the following influential men, who belong to the C.M.A., should be interviewed personally. . . .

Pamphlets . . . have been mailed as follows—Federal and Provincial Ministers; Lieut.-Governors; Senators; M.P.'s; Deputy Ministers and

Senior Officials of the Federal Civil Service, and Presidents and Management of Chartered Banks. By today's mail, we expect to complete the Boards of Trade, and next week, the Directors and Managers of important industrial corporations will be communicated with.

Mr. Robb has not yet told me when the Research Council can meet the Ministry, and I have not pressed for a reply, as it is for consideration whether it will be advisable to wait until the Government have received the resolutions referred to above. . . .

TO THE HON. JAMES A. ROBB FROM F. M. GAUDET, OTTAWA, 10 FEB. 1922

I beg leave to submit further information you desired when considering the estimates yesterday.

1. Q. What is the status of Wilfred Sadler who has been carrying out research in grading milk, cream and butter by character of bacteria?
   A. Wilfred A. Sadler, B.S.A. (Macdonald College), M.Sc. (McGill), N.D.D., British Dairy Institute, University College, Reading, England, Associate Professor of Dairying, University of British Columbia. This work has been completed, and the details thereof, as well as those of other researches, are submitted to explain how money voted last year has been expended.
2. Q. Does Professor Harrison, Macdonald College, receive any salary or remuneration out of grant of $2000 for research in acidity of soils?
   A. No. This would be contrary to regulations (copy attached, see para. 6.) providing that grants are only for actual expenses, but may be used for payment of assistants, and are not intended to support the grantee while carrying out the investigation. In the present case, the money was spent on services of a highly qualified physical chemist, and for the purchase of apparatus with approval of the Department of Agriculture.
3. Q. Do the Misses C. W. Fritz and M. A. Fritz (holders of a Fellowship and Bursary, respectively, at the University of Toronto) belong to the same family?
   A. These grants are made on the recommendations of the President of the University and Heads of Departments, with which the applicant has been connected, who submit a complete record of the candidate's academic career, in accordance with Para. 4 of regulations (copy attached). Awards are made entirely on merit, and there is no information as to the relationship of the above.

4. Q. Are the University authorities consulted before making awards for Fellowships, Studentships and Bursaries?
   A. Please see reply to question 3, above.
5. Q. Why have grants not been made to the Université de Montréal and the École des Hautes Études Commerciales?
   A. Circulars and copies of regulations governing the award of Fellowships, Studentships and Bursaries have been sent regularly to the Université de Montréal. The École des Hautes Études works in cooperation with this University. The grants are made only when applied for by interested persons, and in the case of the Institutions mentioned, no requests for assistance have been received. . . .

TO R. A. ROSS FROM F. M. GAUDET, OTTAWA, 17 FEB. 1922

The result of interviews in Toronto yesterday is as follows—

Mr. T. Stewart Lyon, "Globe", is entirely in favour and has promised his support. Was interested in literature I gave him, and would be glad to have more. Enquired if Mr. Fielding* would give money, and suggests that half a million for building and equipment is, perhaps, much under present conditions. I thought it well to state the case frankly, and he said in reply that he would strongly object to discontinuing activities of Council with consequent loss of work done by it. This interview was quite satisfactory.

Mr. J. E. Atkinson, "Star", considers that industries and interested parties who can well afford to pay for research should do so, and that, in any event, such work, like education, properly belongs to Provincial authorities. I remarked that neither of the above could be expected to undertake problems of national importance, and that, without coordination, inefficiency and unnecessary expense would ensue. I find that he needs more information, as he does not fully appreciate the necessity of even scientific control in manufacturing, and I shall follow him up with literature and a letter. After a prolonged interview, he indicated that he was on the defensive by saying that I was, of course, making the best of my case, to which I replied that there was no special pleading in anything I had said, as the case was too good for that. I urged that he should reserve judgment until he had studied the booklet, and he finally promised that he would, in any event, remain neutral. The conversation was friendly throughout, and interesting, as indicating the point of view of some people.

*The Rt. Hon. Wm. Stevens Fielding, Minister of Finance and Receiver General.—M.W.T.

Mr. F. D. Tolchard, Board of Trade, will arrange immediately for resolutions to be sent to Government by all branches of his organization.

John J. Gibson, President, Rotary Club, could be seen for a few seconds, only, as he had an engagement. He will submit matter to his Committee, and will be followed up by Judge Mott, an active member of the Executive, who is a friend of Mr. Eagleson.

Mr. John O'Connor, President, Kiwanis Club, is favourable, and will send resolution.

I tried to see Premier Drury, but failed, as he was engaged.

In my absence, Mr. Eagleson has arranged for resolution from Ottawa Rotary Club.

As you are in close touch with Walter J. Francis, who is a high official of the Central Executive Rotary Clubs, perhaps you could ask him to obtain resolutions from all branch Clubs, and, meanwhile, a letter and a pamphlet are being mailed to the latter.

MEMORANDUM BY R. A. ROSS OF INTERVIEW BETWEEN MESSRS CAMSELL, MCLEISH AND ROSS AT THE OFFICE OF THE DEPUTY MINISTER OF MINES DURING THE AFTERNOON OF MARCH 3RD, 1922 —RE LIGNITE BOARD APPROPRIATION

Mr. Camsell opened the discussion by stating that they thought it might be possible to cut down the estimates of cost for which an appropriation was asked. . . . The conversation then switched to the question of records of work done in this office, and whether these could be deciphered and incorporated in such a report as would have been presented by the Mines Branch had they been doing the work themselves. It was intimated that they had asked Mr. Stansfield for this, but he had not yet furnished it. I stated that possibly Mr. Stansfield had kept copies of the work he had done, but that all records were in this office and available for this purpose.

I also stated that it was our intention to get out a report indicating the progress to date, not too technical, but to serve as information for the Members of Parliament, Ministers and the public generally.

The trend of the conversation seemed to point to the idea that the Mines Branch might step in and issue a report on the technical features of the Board's work; but they appeared to be doubtful as to whether we would give up the details. I told them that all the information we had was certainly at the disposal of the Government who had furnished the money.

I called their attention to the fact that getting out of reports of this

kind would take some time, and that owing to the delay of two months while negotiating with the three governments that appropriations were more than exhausted, and that I could not take the responsibility of carrying on further unless some immediate cash or bank credit were available. It was intimated that the Government had decided that it was impossible to do anything in this regard until Parliament had met and considered the estimates. It was pointed out that this rendered further operation impossible, and that the staff would have to be notified at once that their services would no longer be required.

It was also pointed out that once this staff was disorganized that the scheme would never be revived.

As these gentlemen were not empowered to do anything else but to intimate that money would only be forthcoming after the budget had been passed, further discussion was useless.

It was also intimated in clear terms that the policy of the Government would be to carry on such investigations and research as is being undertaken by the Lignite Board under the departments in future.

The interview then terminated.

In short, I am of the opinion that the Government has in mind the taking over of the Lignite Board by the Mines Branch.

On my way back to Montreal from Ottawa I carefully reviewed the situation and decided that to carry out what I had intimated to these gentlemen (that I would have to notify the staff of their dismissal, as there was no money to pay) might be distorted into an attempt to wreck the project, so that the only thing left was to resign the chairmanship at once, leaving the incoming administration, whatever it might be, a free hand to act, and to disclaim all responsibility for expenditures from to-day.

TO THE RT. HON. MACKENZIE KING FROM R. A. ROSS, MONTREAL, 4 MARCH 1922

At an interview yesterday in Ottawa between Mr. Camsell, Deputy Minister of Mines, Mr. McLeish, Director of the Mines Branch, and myself, regarding the Lignite Board, it was intimated to me that no further support would be available immediately to carry on the work, and this in spite of the fact that the Board has been promised the support of the Provinces of Saskatchewan and Manitoba. Under this condition there was nothing to do but to intimate to these gentlemen that owing to exhaustion of all appropriations, this promising investigation now nearing success would have to cease immediately. It was also intimated that

it was the policy of the Government to carry on such investigations and researches hereafter within the Government departments.

Under these circumstances there is nothing for me to do but tender my resignation as Chairman of the Lignite Utilization Board, to which I was appointed by Order-in-Council dated August 22nd, 1918.

I also place in your hands for immediate acceptance my membership on the Peat Board, to which I was appointed under Order-in-Council dated March, 1918.

As the policy of the Government appears to be directed toward departmental handling of research in which I can see no prospect for advancement of research in Canada, I tender you my resignation as Chairman of the Research Council, to which I was appointed under Order-in-Council dated August 13th, 1921, and also my membership under Order-in-Council dated November 29th, 1916.

In order to avoid discussion and possible complications unpleasant to all parties, I have refrained from intimating to my colleagues on these several Boards my decision in advance of the dispatch of this letter, but will immediately notify them of my resignation in each case.

I shall, of course, hold myself in readiness to turn over all information and documents to whatever authority is authorized by you to act.

TO NRC MEMBERS FROM R. A. ROSS, MONTREAL, 6 MARCH 1922

. . . You will note that I have resigned from all research activities including the Research Council, as a protest against what I am given to understand is the policy of the Government in relation to our work.

As I took this step without consulting any one, I owe the Research Council an apology and an explanation.

At the interview at which the Dominion Government refused to follow the lead of Manitoba and Saskatchewan in the matter of support, it was made abundantly clear by inference and statement that the departments would carry on all such work hereafter; that policy if carried out eliminates all possibility of a Research Institute being established.

The refusal of assistance throws the Lignite work I assume into the Mines Branch, and they will, of course, reap the glory without much effort, as with any decent handling, and with the present staff, success is certain and that soon by which the department justifies itself over the Council and the Lignite Board who have done the real work.

Under these conditions your Council cannot afford to carry as Chairman or Member one who has merely a record of failure before the public.

By eliminating himself a protest is entered against the Government policy which if it attracts any attention at all should concentrate upon the methods and activities of the departments.

The Council is not involved as it has not been consulted and can call for a show down which is badly needed.

If a show down be not obtained now and support be not received outside of governmental and departmental circles, the Council will inevitably be strangled and finally eliminated.

In my opinion the situation demanded drastic treatment and got it so far as I could do so through a protest direct to the Premier.

I am not satisfied, however, that the claims put forward by the departments as Government policy are in fact anything more than pushing their own views. It is time to call the bluff if this be so, and I could think of no better method than that adopted which should produce an authoritative statement without prejudicing the Council's position.

I have come to recognize more and more plainly that non-departmental bodies such as ours are as grit in the governmental machine only tolerable under war conditions, and to be eliminated as soon as possible as our principles and methods run counter to all political and departmental ideas.

Under these conditions the Council can only hope to maintain itself and produce results through the continuous support of outside bodies, and if the triumphant challenge of the departments be neglected longer, that machine which operates always will grind the Council to powder finally.

As we well know, in spite of claims to the contrary, the departments cannot and practically do not carry on research as we know it on any scale commensurate with the demands of the situation. Effective research is thereby eliminated from the country's programme.

As for myself I am now cleanly and definitely out of the game which frankly is a sport which I cannot afford, as I have to earn a living, and this I cannot do when my head is full of altruistic futilities such as, propaganda, placation of this man or that interest—interesting support here and there, in addition to the real work in research which the Council is established for.

As for the Council itself, I have never been prouder of nor happier in my association with all the members, and my retirement will leave a vacant place in my life which I have no expectation of filling otherwise.

1923 · The Fourth Chairman

"If at first you don't succeed,
try, try again. And then quit.
There is no use being a damn fool about it."
—W. C. Fields

IN AUGUST OF 1923, the Hon. James A. Robb was appointed Minister of Immigration and Colonization, and was replaced as Minister of Trade and Commerce by the Hon. Thomas A. Low. Mr. Low therefore became "our" Minister to the National Research Council, by virtue of his chairmanship of the Privy Council Sub-Committee on Scientific and Industrial Research.

The fourth chairman of the National Research Council was Dr. Frank D. Adams, Vice-Principal of McGill University and Dean of the Faculty of Graduate Studies and Research, whose period in the office of chairman was from May 30, 1922 to October 4, 1923.

Adams and Macallum conferred with Mr. Grisdale, Deputy Minister of the Department of Agriculture, who agreed that the Council might undertake agricultural research provided that it did not invade fields already occupied by the department. Grants in the agricultural realm were to be submitted to the department beforehand for consultation (1).

The Lignite Utilization Board continued to have difficulties, this time by the withdrawal of support by the government of Manitoba (2), which reduced their scale of effort.

Under a grant from the Council, Dr. Harrison, Principal of Macdonald College, did a valuable investigation on the discoloration of canned lobster, and produced a cheap and highly effective way to prevent it. The Council submitted his report for publication through a government control body called the Editorial Committee.

This committee ineptly delayed the publication and followed this by an autocratic cut in the size of the edition from three thousand to one thousand copies. They could hardly have chosen an economy victim more unwisely, and the resulting furore from the fisheries community ended in castigation of the Editorial Committee by the Minister of Labour (3). The Council got its extra copies.

Normally, it is difficult to estimate the costs of research and extremely difficult to estimate the returns from this investment. The more basic the research, the more difficult it is to assign a value in dollars. Certainly the entire electrical industry rests on the work of Faraday, but what about Thales of Miletus, who discovered magnetism? What about Volta and Ohm and Edison and a host of others? The research very quickly becomes confounded with the work of engineers and craftsmen and the foresight, faith, and enterprise of men in the business world. A dollar value may be put on the total result, at a given time, but how much of this can you assign to research and how much to development? How much to a few moments of insight in the head of one man? Obviously it is not fair to burden Faraday or Edison or some other one man with the weight of all these many billions of dollars. Clearly the electrical industry and the subsequent electronic industry are a complex achievement of the whole human race—even the basic research was done, and continues to be done, in many countries.

Sometimes, however, a single application of scientific knowledge does lend itself, for a little while, to estimations of dollar value that are clear, simple, and convincing. Some scientists seize this opportunity to dollar-talk with politicians and heads of industry. The discoloration of canned lobster fell neatly into this category. The lobster industry in Canada, in 1923, grossed about $5 million annually, and the annual loss from discoloration of canned lobster was estimated at $700,000. Harrison's research cost the Council about $2000; yet it was accepted by the industry that his methods could be followed just as easily as the old way, and that the new methods could prevent the loss entirely (3, 4). As it happened, the entire cost of the National Research Council, from its beginning in 1917, up to the announcement of this discovery in 1923, was about $650,000 (5). Therefore the *annual* saving to Canada from this one bit of work (out of many hundreds of projects) was of

greater dollar value than the cumulative cost to Canada of supporting the Research Council for its first seven years.

This was not much of a talking-point, compared with the glittering hope of defeating the rust diseases of wheat, which could save as much as $30 million annually to Canada—but the saving on lobsters was something already achieved, and served for a time as evidence of the wisdom and soundness of investing in research by way of this particular kind of government organization.

The Council kept up a steady, intense "committee" activity on such topics as fuel, industrial alcohol, nitrogen fixation, concrete in alkali soils, the complex ores of British Columbia, air research, food research, destruction of wooden piling by a boring mollusc called the teredo, and a great many other subjects. Their "Assisted Research" programme was going well, from the bacteriology of fish curing to an investigation on ultra-violet light and X-rays. And of course they kept on at the basic and vital task of awarding fellowships, studentships, and bursaries.

For some time, against this steady background of familiar chores, the Council had been producing detailed estimates for their proposed National Research Institute (6), lists of research problems suggested by their Associate and Advisory Committees for possible solution in such an institute (7), and considerations of a possible site in Ottawa (8, 9).

Now, under the chairmanship of Adams, the Council made a formidable attempt to have their institute founded, by formal presentation to the Sub-Committee of the Privy Council on Scientific and Industrial Research (10). Their ideas were very similar to those in the bill passed by Parliament in 1921, with the important modification that the Council remain under the control of the Sub-Committee instead of being placed under the minister of any particular department (10).

Their reception by the Privy Council Sub-Committee must have been too discouraging for words, since nothing is recorded in the following meetings, except "matters of general policy were discussed"—and a sad note, four months later, recording their agreements to disband their special committees on such topics as the site of the National Research Institute, who should be chosen as director, and the associated industrial guilds for research (11).

Dr. H. M. Tory, President, University of Alberta, was made a member of Council in place of Lloyd Harris, who had resigned (12).

Adams had tried to find a qualified successor to Col. Gaudet as technical executive officer, but without success. The system of having an honorary chairman on a part-time basis plus a full-time executive to assist him was therefore breaking down. As one way out of his difficulties, Adams thought of reverting to the original organization, with a full-time administrative chairman to fill both functions, as Macallum had done. He asked Tory if he would consider such an arrangement, and Tory said he would (13), but that he would have to keep the welfare of his university in mind. He accepted the position of honorary chairman for the time being, dating from October 5, 1923.

REFERENCES

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2. Report No. 28, Lignite Utilization Board, Oct. 15, 1923.
3. Exhibit E, Proceedings, 53rd Meeting, NRC, May 25, 1923.
4. The Honorary Advisory Council for Scientifie and Industrial Research (NRC), Synopsis of Its Organization and Activities, 1917 to 1924, Appendix H. National Science Library.
5. *Ibid.*, Appendix U.
6. Exhibit F, Proceedings, 47th Meeting, NRC, May 19, 1922.
7. Exhibit G, Proceedings, 47th Meeting, NRC, May 19, 1922.
8. Min. 7, Proceedings, 48th Meeting, NRC, Sept. 9, 1922.
9. Min. 6, Proceedings, 50th Meeting, NRC, Nov. 24, 1922.
10. Mins. 19, 20, 21, Proceedings, 51st Meeting, NRC, Feb. 9, 1923.
11. Min. 12, Proceedings, 54th Meeting, NRC, June 11, 1923.
12. Exhibit D, Proceedings, 52nd Meeting, NRC, April 12, 1923.
13. Mins. 1 and 2, Proceedings, 55th Meeting, NRC, Oct. 26, 1923.

1923 · The Fifth Chairman

"Every man is to some degree a scientist.
It is misleading that a tiny fraction of the population
is composed of individuals who possess a high
degree of scientific skill, while most of the rest are
indifferent or poor scientists. This creates the
false impression that there is a difference in kind, when
it is actually only one of degree."—Warren Weaver, 1955

THE COUNCIL'S SECRETARY, Mr. S. P. Eagleson, wrote a brief series of memoranda for the benefit of the new chairman, Dr. Tory. Eagleson began with the behaviour of the Department of the Interior, who were busily concealing the fact that it was the Council who initiated forestry research at Petawawa,* with grants totalling $23,000. Eagleson also produced a delightful letter to the Hon. T. A. Low,* in which he instructs that minister to write the word "approved" in the margin opposite each grant in aid of research—after all, every grant is very carefully considered by men who know about such things and they are therefore recommended for favourable consideration only!

The Department of National Defence offered to share the Edwards Mill property with the National Research Council, if that property should happen to come into the hands of the government.* Tory was not impressed with this offer,* since he was already negotiating with the government to secure the entire property for the Council. This site had a number of old mill buildings on it, which could be converted into laboratories. A very attractive feature was that this site also contained a power station, which extracted power from Rideau Falls. The government moved slowly in the

*Document quoted in this volume.

matter, but five years later the entire Edwards Mill property was awarded to the Council.

DOCUMENTS

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 20 OCT. 1923

I would call your attention to a further example of the attitude of certain officials of the Department of the Interior towards the Research Council. . . .

As you are aware, the Research Council, in 1917, acting on an appeal from the Dominion Forestry Branch for assistance to initiate certain forest research in Canada, granted, during that and the three succeeding years, a total of $22,985.21 for the purpose of initiating and advancing the Petawawa forest survey . . . three or four years earlier than would otherwise be possible. At the end of the fourth year, the Forestry Branch announced that it was prepared to continue the work without further financial assistance from the Research Council and the latter then withdrew entirely from the investigation.

During this period, the Acting Director of Forestry, T. W. Dwight, appeared to be favorably disposed to the Research Council, but later on a decided change in his attitude occurred. As one indication of this, I may refer you to an article which he wrote entitled "Forest Research in Canada", which appeared in the October and November, 1922, issue of the Canadian Forestry Magazine. In this article, he went very fully into the work carried out at Petawawa, admitting that this was the principal research activity of his Branch. He gave credit to the Conservation Commission and several other organizations for the interest which they had taken in forest research, but nowhere throughout the article was the name of the Research Council mentioned.

I would now call your attention to Circular No. 17 . . . written by W. G. Wright, Head of the Research Division of the Dominion Forestry Branch, and again you will notice that the Conservation Commission and other organizations are mentioned, that the work of the Dominion Forestry Branch at Petawawa is featured, but that the Research Council is nowhere mentioned. . . .

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 7 NOV. 1923

I enclose . . . a copy of a statement which I have prepared and issued

through Canadian Press, covering the last meeting of the Research Council. . . .

[STATEMENT TO PRESS]

The first meeting of the Research Council of Canada which has been held since the appointment of President H. M. Tory as Chairman of the Council, has just been held at Ottawa. Reports were received from various Special and Advisory Committees, and a number of important questions were considered among which the following may be mentioned.

The Chairman of the Associate Committee of Chemists reported regarding questions considered by the Committee at its last annual meeting. . . .

The Research Council has received a number of detailed technical reports from its Special Committee on Nitrogen Fixation, and . . . it was decided to issue a condensed report. . . . Professor J. C. McLennan, Head of the Department of Physics, University of Toronto, and Chairman of the above Special Committee, is now engaged in the preparation of this report.

During the past three years the Research Council has been co-operating with the Engineering Institute of Canada, the Canadian Pacific Railway, the Canada Cement Company, the Government of Saskatchewan and other organizations, in an investigation of the cause and prevention of the disintegration of concrete structures in the alkaline soils of the western provinces which has caused losses amounting to millions of dollars. . . .

The Council dealt with a number of applications for financial assistance in aid of proposed investigations, and also received a report from its Standing Committee on Fellowships, Studentships and Bursaries which showed that 45 graduate students are at present working, under the auspices of the Council, in the Science Departments of various Canadian Universities, all of whom are taking post graduate training in research work. . . .

A report was received from the library of McGill University with which the Research Council is co-operating in the publication of a catalogue of the scientific periodicals available in Canadian libraries. . . .

The Council had under consideration a request that it take the action necessary to establish a Canadian section in the International Union of Pure and Applied Physics, and it was decided that this request should be complied with. . . .

Consideration was also given to the question of the utilization of Canadian cut flax straw for paper making. . . .

The Research Council, through its Associate Air Research Committee

in co-operation with the Department of National Defence, arranged last spring for the re-erection of the four foot wind channel in a new building provided for that purpose at the University of Toronto. . . .

Another matter which engaged the attention of the Council was a suggestion that Canada co-operate with other countries in connection with the standardization of symbols and units used in scientific work. . . .

TO THE HON. T. A. LOW FROM S. P. EAGLESON, OTTAWA, 7 NOV. 1923

I enclose, herewith, for your approval as Chairman of the Sub-Committee of the Privy Council for Scientific and Industrial Research, a statement covering two grants for assistance to researches. Both of these grants have been very carefully considered, first, by our Standing Committee on Assisted Researches and, afterward, by the Council in session, and are recommended to you for favorable consideration. Detailed information concerning each grant will be found in the attached statement.

It has been the practice of the Research Council to submit, for confirmation by the Minister, all grants for research recommended by the Council and, for your information, I may explain that it has been the practice of your predecessors in office to write the word "approved", or any comment desired, in the margin opposite each grant and to then initial the statement and return it to this office, in order that it may be filed in our records. A duplicate of the statement is enclosed, herewith, in order that, if you desire, it may be filed in your office.

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 20 NOV. 1923

The Department of Mines reports that there are at least 37,000 square miles in Canada covered by peat bogs from five to ten feet deep, many of which lie in Central Canada, where there is no coal. It is estimated that one square mile of peat bog contains an amount of peat equal to 430,000 tons of coal used for heating purposes. Attempts have been made at intervals for the past sixty years or more to utilize this Canadian peat, but without success. The best results were obtained by the Federal Department of Mines in their operations a few years ago on the great peat bog at Alfred, on the line of the C.P.R. between Ottawa and Montreal. This investigation, however, was not carried to a stage which induced private interests to take up the production of peat as a commercial proposition.

The Research Council, after a careful study of the situation, decided that it should be possible to cut down the cost of producing air dried

peat and thus put this material on the market at a price which would make it readily saleable. Co-operating with the Federal Department of Mines, the Research Council arranged with the Dominion Government and the provincial Government of Ontario for the appointment, jointly, of a Peat Board and for the provision of grants by the two governments for the carrying out of the work of this Board.

The above Board has never at any time been under the control of, or in any way responsible to, the Research Council, but has operated under the Federal Department of Mines, so far as Federal control is concerned.

The Peat Board decided to undertake work at the Alfred bog and carried on operations there for three summers. They have used a machine similar to that formerly developed by the Department of Mines and have designed a new machine of greater efficiency. They have been successful in greatly reducing the cost of manufacture.

In 1920 they made 5,900 tons of excellent air dried peat at this bog. The peat which has been produced was sold under commercial conditions in the City of Ottawa, and in some 25 smaller cities and towns of Central Canada. It was found to meet with a ready market everywhere in competition with coal, and ten times as much could have been sold, had it been possible to produce it. Offers were received from individual companies to take the whole output of the bog. The peat was sold at varying prices, which, however, in every case left a good margin of profit.

The Peat Board, having achieved its objective, has discontinued operations. It has demonstrated that the production of air dried peat is a commercial proposition and, therefore, the development of peat resources is now a matter for private enterprise. . . .

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 30 NOV. 1923

. . . General A. G. L. McNaughton, Deputy Chief of General Staff, Department of National Defence . . . informed me . . . [of] the attitude of his Department toward the Council and the proposed Research Institute. He stated that they are extremely favorable and are most anxious to help our proposal along in every possible way, as they have many problems which they would be very glad to turn over to such an institute, if it were established.

With regard to the Edwards property . . . if the Department of National Defence and the Research Council can arrange with the Government to use the site in question, the property could be turned over by the Government without any cost to either of us. . . . I may say that the impression which I gathered was that he [General McNaughton]

is prepared to co-operate with or assist the Research Council in every way possible. He seemed to go out of his way to give this impression and, as I have said, he stated that this is the official attitude of his Department towards the Council and the proposed research institute. . . .

TELEGRAM TO S. P. EAGLESON FROM H. M. TORY, SASKATOON, 5 DEC. 1923

Things are as I expected Department of Defence wants everything and our cooperation was only asked because we were in ahead

1924 · The First President

"Let us remember that science is an achievement of the human spirit, and resolve that we will foster it for its own sake, not solely for the wealth and power that it will bring. The respect for truth, the freedom of intellects, the moral discipline that it engenders, are worth more than these. Get them for their own sake, and my conviction is that what remains will be added unto us."—Viscount Hailsham, 1963

LIKE HIS PREDECESSORS in the office of chairman of the National Research Council, H. M. Tory was convinced that central laboratories were needed in addition to the programmes on scholarships, grants, and committee activities. He seemed to regard this objective as a problem in education, since it could never be achieved except by altering the minds of the public of his day, including those supreme public organizations, the Parliament and the Senate.

He went about the problem in various ways. The basic motive on which he could count most heavily was the desire for money; times were hard, and the fumbling for a better life obtruded everywhere (1). Among the various reasons for a sharply increased tempo in Canadian science, Tory seized upon two: the usefulness of science and the fact that other countries and peoples were "going in" for science at a smart pace. In season and out of season, Tory twanged on these two chords; he could not bring himself to turn down an invitation to speak to any kind of gathering, from a conference of prime ministers to a men's club meeting in the basement of a church.

When scientific and technical problems were before the Council, whether for grants, for scholarships, or for action by committees, Tory tended to favour the practical short-term problems that would

make a noise; among the long-term projects, he favoured those with a staggering pay-off, preferably in the tens of millions of dollars.*

He made the most of what had already been accomplished by the Council, and invariably selected the highly practical applied work for special mention, relegating the theoretical achievements to a bare list, by title, in an appendix. He did not hesitate to reach back over the years; in his reports and speeches, he used synopses of everything the Council had done since the beginning (2).

In his saga of the Research Council, Tory inevitably distorted the picture to some extent. He knew very well that you cannot see some stars by staring directly at them; they appear a little to one side when you are looking near them. Tory made science look like a head-on race for utility, whereas often utility is merely a bonus while seeking another goal in the same general direction. Sometimes even Tory would note, for instance, that the cyanide industry had been established in Canada as an accidental off-shoot of the complex sulphide ore problem, before the main problem had been solved (3), this being one of the long list of researches sponsored by the Council.

Utility is universally respected; curiosity is not generally considered to be respectable. Therefore, by the word "science," most people understand the whole chain of activities *except* the real science with which it begins.

However, Tory was a child of his era, and if he really wanted to found laboratories he could hardly avoid sounding the note of utility as clearly as possible. It was a necessary emphasis, since his public was unlikely to react to any other kind of appeal except the appeal to their own pockets. And Tory did not lie—everything he said about the usefulness of science was true—except that usefulness is not the motive that powers the search. Tory told the truth, but not the whole truth. His lack of frankness was to store up trouble in the years ahead.

Even so, in 1924, in spite of Tory's carefully prepared propaganda (4), his attempt to found a research institute by legislative action failed. He was not too downcast by this failure and, in fact, seems to have traded his institute at this time for other legislative gains.* He had rewritten the Research Council Act of 1917 in such

*Document quoted in this volume.

a way that the "research institute" could be (and was) struck out, but the other changes were assented to (5) on July 19, 1924. This was probably a very good trade, since in later years he also acquired the institute.

The major changes in the Act were to put the Council definitely in charge of the country's physical standards, and to state boldly what hitherto had been merely implied, i.e., that the Council had complete charge of appointments to its staff including the power to control salaries, and belonged to that brood of government organizations that have a large measure of independence ("is hereby constituted a body corporate capable of suing, and being sued"). This kind of agency later became known as a Crown Corporation.

Among the minor differences between the Research Council Act of 1917 and Tory's revision in 1924 is the interesting change in title from "Chairman" to "President." Like James the First of Great Britain (Sixth of Scotland), Henry Marshall Tory became the First President of the National Research Council (Fifth Chairman).

Perhaps to balance the change from "Chairman" to "President," the Sub-Committee of the Privy Council on Scientific and Industrial Research now and henceforth became the "Committee." By the NRC Act of 1924, not only did everything scientific actually become more important, it also seemed to be more important.

A definite rift appeared between Tory and Macallum, and started to widen rather rapidly. Macallum stated his differences with Tory in what, for him, seem rather moderate terms;* whereas Tory began using terms that, for him, were violent* (6). A pattern seems to emerge in which Tory is unable to encompass large doings and important enterprises without the stimulus and excitement of controversy. This is reminiscent of Macallum at his best; in both men, creative achievements were accompanied by aggressive behaviour, and no light came without its measure of heat.

REFERENCES

1. Letter, H. M. Tory to the Hon. Charles Stewart, Minister of the Interior, Jan. 26, 1924. NRC Papers, National Science Library.

2. Report of the Honorary Advisory Council for Scientific and Industrial Research for the year ending March 31, 1924. National Science Library.
3. National Research Council, Synopsis of Its Organization and Activities, 1917 to 1924, Appendix I. National Science Library.
4. *Ibid.*, pp. 2–14.
5. 14–15 George V, chap. 64. The Research Council Act. Assented to July 19, 1924.
6. Letter, H. M. Tory to S. P. Eagleson, Feb. 19, 1924. NRC Papers, National Science Library.

DOCUMENTS

INTERNAL RELATIONS

TO S. P. EAGLESON FROM J. C. MCLENNAN, TORONTO, 8 FEB. 1924

. . . In regard to the helium research* there are two points that ought to be attended to at once:

1. We should have the Department of Defence appoint their representative on the Committee, and take the necessary steps to assure us of their grant of $5,000.
2. We should have assurance that the British have made a firm offer of one thousand pounds for this research. Perhaps the papers now in possession of the Department of Defence made this certain. The British should be informed, preferably by cable, of what action we have taken, and asked for the necessary assurance. The Committee should then function immediately. I am ready to take action as soon as these matters are settled.

Finally we should see that the grant of the Advisory Council for $5,000 is assigned so that it does not lapse. Perhaps the best way to handle this would be to have it sent to me as Chairman of the Committee.

I am leaving for England about the middle of April and should like

*McLennan was deeply interested in helium both for its very low boiling point—only four degrees above absolute zero—and for its practical use in dirigible balloons.—M.W.T.

to take hold of this matter immediately so that we can get it well under way before that time.

EDITORIAL FROM THE *Gazette*, MONTREAL, 11 FEB. 1924

Canadian Helium

. . . It is asserted that the gas of the Calgary district is filled with helium, the most modest estimates figuring that $50,000,000 worth escapes annually without utilization. Professor McLennan has perfected the means of separating and collecting helium, and it is just possible, if war had lasted another few months, that all the gas bags in use in France and Flanders would have been filled with the much-discussed substance. It is to be hoped that the new references to Canadian helium will be followed up, and that this very important industrial development will be pursued to definitely useful fruition. Canada has played a very important part in research work in connection with the aeroplane already, and it will be a further feather in her cap if within her own confines she is able to give to the Empire the "filling material" for airships so urgently needful.

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 23 AUG. 1924

. . . On Wednesday last, Hon. J. E. Sinclair, M.P. for Queens, P.E.I., phoned inquiring regarding the present status of and future plans for the fox investigation. I informed him that up to the present time the Research Council, in cooperation with the Department of Agriculture, have carried out the investigation through an Associate Committee appointed by the Research Council for this purpose . . . but that about a year ago the Council had formally notified the Department of Agriculture that it was of the opinion that the investigation had reached a stage where it should either be discontinued or placed on a permanent basis under the auspices of that Department. . . . I also informed him that I understood that the Department of Agriculture is preparing to place the investigation on a permanent basis and suggested that, if he desired authentic information regarding their plans, he consult with Dr. Grisdale. . . .

TO S. P. EAGLESON FROM A. S. MACKENZIE, HALIFAX, 19 FEB. 1924

I have just received a letter from Dr. Tory referring to the request of Professor Buller of the University of Manitoba that Mr. —— be given a grant of $300.00 to enable him to complete his present work at Winnipeg. Mr. —— applied for a Studentship last year, but, on account of being married, was ineligible. Dr. Tory raises the question that, on

account of his usefulness as a plant pathologist, and because of the scarcity of plant pathologists and the great need for them in Canada, we might break the regulation about being married in Mr. ——'s case. I do not at all agree with him in this. We have consistently in the past year or two turned down the applications for Studentships, etc. of men who have broken this regulation, and I do not believe in being inconsistent now. You may recall the case of a French student (from Laval I think) who wanted to study at London, and whose case, against a goodly pressure, was turned down. To turn around and grant to —— the very thing which we refused the last man would be to stultify ourselves. I think it is a good rule and it should be carried out impartially.

I think a way might be found, however, through the Assisted Research Committee to grant to Buller a small sum of money to pay for the part time of an assistant to carry out the research he has in mind. I would suggest that this matter be brought at once to the attention of the Chairman of the Assisted Research Committee.

TO H. M. TORY FROM W. C. MURRAY, SASKATOON, 11 FEB. 1924

I am writing a letter of recommendation favouring the grant.

It is somewhat interesting to find Buller explaining how marriage would help a scientist. The next time I see him I am going to urge him to practise what he preaches.

TO S. C. PRESCOTT (M.I.T.) FROM A. B. MACALLUM, MONTREAL, 3 MAY 1924

I have your letter of April 23rd in reference to Mr. —— of Truro, N.S., on the subject of permission, while holding a bursary from the Research Council of Canada, to carry on graduate work in Industrial Microbiology, Food Technology and Biochemistry at the Massachusetts Institute of Technology.

Mr. ——'s application for a bursary has not yet been considered by the Research Council, and of course I do not know what chance he has of winning one. There are a very large number of applications for bursaries, and in excess of the number that will probably be awarded.

The question therefore of whether he will be allowed to hold a bursary while studying under you might not possibly come up at all. Further, the Research Council has hitherto been insistent upon the observation of its rule that those holding studentships, bursaries and fellowships must attend Canadian institutions, unless it can be very decisively shown that the course of study desired can only be obtained abroad. In defence of this it may be pointed out that the development of scientific research in

Canada can only be encouraged by promoting in every way possible the development of research departments in the Universities and Technical Colleges in Canada. As a result of enforcing this policy for the last eight years, a number of Universities have succeeded in fostering Graduate Departments of high standing in the various sciences, and this will make it difficult to alter the rule referred to.

If, however, it can be shown that an adequate course in Industrial Microbiology and Food Technology cannot be obtained in Canada, a case will be made out for allowing Mr. ——, if he gets a bursary, to go abroad for it. . . .

TO A. FRIGON (DEAN, ECOLE POLYTECHNIQUE) FROM S. P. EAGLESON, OTTAWA, 30 SEPT. 1924

I enclose, herewith, a copy of a letter, which on the 16th instant, I addressed to Mr. ——, who has been awarded a Research Council Bursary under the supervision of Professor Riou for the present year. . . . If I interpret his letter correctly, he states by inference that he will not begin the tenure of his award until he receives the first payment. In other words, he, apparently, has an entirely wrong attitude towards this award. He seems to assume that he has been hired by the Research Council to work for nine months and that, unless the Council pays him promptly in advance, he is under no obligation to begin work. . . .

MEMORANDUM BY H. M. TORY TO THE CHAIRMAN OF THE COMMITTEE OF THE PRIVY COUNCIL ON RESEARCH, OTTAWA, 19 NOV. 1924

I have the honour to submit, herewith, for your approval as Chairman of the Committee of the Privy Council on Research, the following resolution, which was formally passed at the 58th meeting of the Research Council: "It was moved by Dr. Adams, seconded by Dr. Ruttan and resolved that Dr. Tory receive an honorarium at the rate of $3,000 per annum, while serving as Honorary Chairman of the Council." . . .

Such an honorarium has been paid, in accordance with this arrangement, to each of the three gentlemen who have preceded me in the post of Honorary Administrative Chairman of the Council. In addition to this, the post of Technical Executive Officer* has been vacant for the entire period during which I have served as Honorary Chairman and this has, obviously, placed a much heavier burden on the shoulders of the Honorary Chairman than was contemplated.

Approved T.A.L.

*Whose salary was $7,000.—M.W.T.

RELATIONS WITH CONTROL AGENCIES

TO THE AUDITOR GENERAL FROM S. P. EAGLESON, OTTAWA, 11 JULY 1924

. . . The Chairman of the Research Council has recently discussed with you the difficulties which would confront the Council, if all the general departmental regulations were enforced in connection with such grants and you will, therefore, appreciate the fact that it is impossible for the Council to furnish each month information as to the miscellaneous wages paid under these awards.

. . . if, under the circumstances, the Council were forced to demand from grantees monthly returns and statistics, or in other words, to insist on what to them would appear to be unnecessary routine in connection with the small amount of money which has been entrusted to them for expenditure, the result would probably be that many investigators would refuse to co-operate with the Council and those who did would probably ignore our demands for monthly returns.

In conclusion, I may point out that it has been the experience of the Research Council that it is not difficult to secure co-operation in connection with these investigations from the most highly trained scientific workers, if they are given reasonable latitude in matters of routine, nor, during the seven years in which the Council has been in existence, has there been any serious difficulty in securing full and satisfactory vouchers covering expenditures which have been incurred under grants for research.

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 25 FEB. 1924

I enclose, herewith, a copy of a letter and of the attached account received from Mr. Mackenzie, Assistant Secretary of the Royal Society of Canada, covering the publication of ——'s report. You will note that the total amount of this account, including the 500 copies of the report, is $957.83, and the question arises as to whether it is the intention of the Council to pay only the exact amount of this account or to follow the practice of previous years and make a donation to the Royal Society for an amount in round figures, on the understanding that such a grant is to cover the cost of this report.

. . . you will appreciate that while the Auditor might be quite willing to pass a blanket grant given by the Council to the Royal Society for this

purpose, it is not impossible that if he were to receive an itemized account for the printing of a report and the furnishing of copies of reprints, it might be difficult to persuade the Auditor to look at the matter from the same point of view as he would in approving of a blanket grant. It would, of course, be the same thing from our point of view, but it is not impossible that his point of view would over-emphasize rules and regulations regarding Government printing. . . .

RELATIONS WITH GOVERNMENT

TO FRANK D. ADAMS FROM H. M. TORY, OTTAWA, 22 JAN. 1924

After I saw you on Saturday evening I got a telephone message from Macallum. . . .

He immediately opened up with me the question of the Bill which I had proposed. I soon saw that he was jealous of any change being made in the old Bill although he firmly asserted that while he had drafted the ideas that were in it he had not drafted it in two sections. His plea was that if we changed the Bill at all we would have trouble getting it through and that he saw very serious difficulties in the road, and began to talk about the wisdom of seeing Meighen.

I replied to him that I thought he was approaching the subject from the wrong angle; that in my judgment Meighen should not be approached at all. His idea was that he might drop into conversation about something else and then come on to this. I said I did not for a moment believe it was necessary to do it in that way; that if it became necessary for me to discuss the matter with Meighen, I would write him a letter, stating what my business was and making an engagement with him, then he could make his choice whether he would see me or not, and that I was opposed to any visitation in any other manner.

When I suggested that Hume Cronyn had already seen him and was in personal relationship with him he began to throw doubts on Cronyn's relationship to Meighen, stating that they had had some difference of opinion etc. etc. Then he gave me as a reason why the old Bill had been defeated, because of [Senator] Smeaton White's dislike for Ruttan. It seems there was an old quarrel somewhere, I do not know the cause.

I did not tell him of the difficulty which he himself had created, but I saw at once that anyone that I would suggest as being useful to use in action he was ready to throw doubts upon. As a matter of fact, he was

trying to impress me that no one else had sufficient influence to get things done but himself. He promised me, however, that he would not interfere till after next meeting as I stated my view was that not a single word should be said outside about the new Act until after the Government had itself given us a final answer and were committed one way or the other. Then we could take the matter up after our next meeting. He agreed to this but at once suggested that we have a dinner out at the Country Club and have Meighen present. I again repeated my objection to that method of dealing with the matter.

Now my fear is that he will mess around objecting to the Bill and create an impression that we are making changes that ought not to be made. I told him that if it were put in the old way, namely, with a Director of the Institute separate from the Chairmanship, that personally I would cease to be interested in it, and he agreed that certainly I should have my way but still kept raising difficulties.

I wonder if you know Smeaton White and if so whether you could personally talk to him about the new situation that has been created? I foresee serious diffieulties if Macallum is not kept in his place.

Have a chat with Ruttan. Do not tell him what I have said about his statement regarding Smeaton White, but just tell him of my anxieties and then I think that you and he should take steps to curb Macallum's activities if you can. He will certainly be going to Ottawa before long messing into this thing if he is not stopped. I hate to suggest this extra burden to you but I am more anxious about him than I am about the politicians in Ottawa.

Drop me a note to Edmonton telling me what you think of this letter and if you think I am over anxious. I am completely confirmed in my opinion as to the wisdom of his remaining on the Council. Something has got to be done or I will break loose some day in Council—a thing I have never before done in my lifetime.

TO H. M. TORY FROM FRANK D. ADAMS, MONTREAL, 30 JAN. 1924

. . . To-day I had an opportunity of seeing Dr. Macallum himself and told him that I had received a letter from you stating that you feared that if members of the Council discussed the future programme of the Council with sundry and divers persons before the matter was formally lodged that much danger might be done.

Dr. Macallum told me that while he felt apprehensive on certain points himself, he certainly would not discuss the Research Council matters with anyone but would "play the game".

I told him that every member of the Council would be expected, of course, to set forth any objections and to put forward any criticism of the new Bill at meetings of the Council, but that the Council should act as a unit outside of the Council Room. He assured me that he fully understood this and intended to follow this line of action.

Dr. Macallum said that when in Ottawa at some meeting or dinner Dr. Grisdale without any suggestion from him said that Dr. Tory had been having a meeting with certain of the Ministers in Ottawa and had spoken of the importance of carrying on investigations on wheat rust, but that Mr. Motherwell had not fallen in with Dr. Tory's views as the other members of the Government had. Dr. Macallum did not carry the subject further but mentioned this to indicate that there were certain Departments of the Civil Service at any rate which would not view with equanimity our entering upon all fields of investigation.

I think, however, that matters are comparatively safe in the meantime. . . .

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 11 APRIL 1924

With reference to the proposed Research Council legislation revising the Research Council Act, I have been wondering whether it would not be advisable to distribute to the members of the Commons, and particularly the members of the Senate, a copy of the interim and final reports of the Special Committee of the House of Commons which investigated the question of scientific research in Canada for two sessions . . . in view of the fact that when the question came up before, the members of the Senate did not appear to even know that such a committee had even been in existence, it is particularly desirable that this information should be placed in their hands at the psychological moment. . . .

TO HUME CRONYN FROM H. M. TORY, OTTAWA, 20 MAY 1924

. . . With regard to the general outlook for the Research Council, Mr. Stewart* informs me that the Bill has not yet been before Parliament, but that he has been waiting for the passage of the budget and that in a day or two now it will be brought up and pushed through as rapidly as possible. I do not think there is any doubt that we will get the Bill this year. What follows is in the lap of the gods. Before we finally settle affairs, we shall need all the good business help possible; so get well. . . .

*The Hon. Charles Stewart, Minister of the Interior, was Premier of Alberta when H. M. Tory was President of the University of Alberta.—M.W.T.

TO H. M. TORY FROM F. A. MCGREGOR (PRIVATE SECRETARY TO THE PRIME MINISTER), OTTAWA, 26 JUNE 1924

The Prime Minister has been much pleased to receive, with your letter of yesterday, the synopsis of the organization and activities of the Honorary Advisory Council for Scientific and Industrial Research between 1917 and 1924. In the form in which this statement has been prepared it will be most useful to Mr. King's purposes, when matters affecting the Council are under discussion in or out of Parliament.

TO H. M. TORY FROM HEWITT BOSTOCK (SPEAKER OF THE SENATE), OTTAWA, 30 JUNE 1924

I am very much obliged for your letter of the 27th instant, and also for the dossier containing "A Synopsis of the Major Activities of the Research Council During the Past Seven Years."

. . . I can assure you that I shall be glad to do all I can to help the Research Council along reasonable lines, as I think there is a great opportunity for it in the development and upbuilding of this country.

TELEGRAM TO THE HON. CHAS. STEWART FROM H. M. TORY, EDMONTON, 2 JULY 1924

Have wired Low sincerely hope Research Council Act not going by default. Have put in hard year seeking private financial backing Council's work as requested by Prime Minister. Have made substantial progress our act necessary to secure backing. If necessary eliminate reference Research Institute. Please urge matter. Regret bother you.

TELEGRAM TO H. M. TORY FROM THE HON. CHAS. STEWART, OTTAWA, 3 JULY 1924

Have arranged with Premier to eliminate Research Institute Section and make some other changes Mr. Low out of House for few days but I will take charge.

TO THE SECRETARY, NRC, FROM THE SECRETARY, ASSOCIATE COMMITTEE ON AIR RESEARCH, OTTAWA, 14 FEB. 1924

At the recent meeting of the Associate Air Research Committee, Commander Stedman, who had just returned from a tour of inspection in the West, drew attention to the valuable nature of the work done by Professor C. A. Robb of the University of Alberta, especially in connection

with the development of proper methods of starting aero-engines in cold weather, and in connection with the difficulties arising from the freezing of radiators, pointing out that the maintenance of a daily patrol throughout the Winter at the High River station of the Royal Canadian Air Force had been much facilitated by the application of methods advised by Professor Robb.

I was requested to write to you, asking you to bring this matter to the attention of the Research Council, and stating that the A.A.R.C. appreciates very highly the work which Professor Robb has done.

TO H. M. TORY FROM THE HON. CHAS. STEWART, OTTAWA, 16 FEB. 1924

. . . With reference to the investigation into the matter of rust—I can quite believe that our friend Grisdale would bristle up at any interference with his work. On the other hand, I think if he would agree to pitch in his services would be valuable. I will take the matter up with the Minister and suggest to him that no active measure be taken until your return.

. . . The Prime Minister is out with his little red pencil and I do not know whether (from a financial point of view) we will be able to draw our breath after he gets through red-pencilling our requests for new expenditures.

TO H. M. TORY FROM A. B. MACALLUM, MONTREAL, 18 FEB. 1924

. . . There is a sum of five hundred and sixty thousand dollars at the credit of the Wheat board, the ultimate disposal of which is now a question. Some have suggested that it be divided up amongst the Provinces of Alberta, Saskatchewan and Manitoba. Others, again, say that it should be held over for some purpose which may be of assistance to agriculture.

I would suggest that you apply for this amount to start an investigation which would result in the breeding of a variety of wheat which would be resistant to the nearly thirty strains or varieties of rust which occur over the three provinces. This would take some eight or nine years of steady work under highly trained experts, who would be sure in the end to produce a variety which would prevent the terrible toll that rust entails upon these Provinces. The loss from rust is commonly estimated at $30,000,000 a year. $500,000 to successfully breed a variety of wheat which would abolish this toll would confer in the end an enormous benefit on agriculture.

I urged Dr. Tolmie, when he was Minister of Agriculture, to set aside

$500,000 for this purpose. He lacked the insight necessary, and consequently the suggestion was not adopted. I am rather glad now that it was not because had the Department undertaken it the investigators would have to be appointed by the Civil Service Commission, with salaries ranging from $1500 to $3000 a year, which would make the investigation a farce.

Some four years ago Mr. Crerar, the former leader of the Progressives, suggested that the surplus which was then accumulating, and which was then about $360,000, should be given to aid in the establishment of a National Research Institute. It did not seem to me that this would carry with either the Government or the Progressives, and consequently the suggestion was not followed up. I think that this suggested disposal of the $560,000 would meet almost universal approval. I would therefore urge that you take action at once regarding it.

As to the study of the varieties of rust, that has been done and nothing can in that way be ascertained that will serve to prevent the incidence of rust. The breeding of the kind of wheat necessary will.

TO A. B. MACALLUM FROM H. M. TORY, EDMONTON, 7 MARCH 1924

I beg to acknowledge your letter of Feb. 18th with regard to the question of the rust. I beg to say that I already have the matter well in hand and, unless it is complicated with the Department of Agriculture, it will go smoothly. I wrote to Dr. Grisdale since I got home telling him I intended to see him as soon as I went back to Ottawa and we would go over the whole matter together.

I have already been in communication with the government as to the possibility of using the surplus of the Wheat Board money for the research work. I had not quite thought of it in the same way as you have. I suggested that it be a fund for research work in the agricultural stations in the three western provinces from which the money came, the programme to be agreed upon by the three universities and with the approval of the Research Council. I do not know whether anything will come of it but at least I have made the effort.

TO H. M. TORY FROM J. H. GRISDALE, OTTAWA, 26 FEB. 1924

I have your letter of the 5th instant, in regard to research work with respect to rust. . . .

The work in Canada merely lacks magnitude, but what is being done at present follows intensively the discoveries made in Minnesota. The work in that regard is proceeding as satisfactorily as possible. . . .

The Department commenced this work in 1917, during the war, and

under exceedingly difficult economical conditions. It was confronted with many serious difficulties, financial and otherwise, especially as regards securing a competent staff of men to take charge of work of this kind, which is recognized by all who are familiar with it, as including some of the most peculiarly difficult problems.

The experiences of the Department during the past few years have been most valuable, and have enabled it to arrive at some conclusion as to the manner in which this work might be extended and consolidated. It has at present under consideration a scheme to centralize and co-ordinate the work of several of its western field laboratories, with a view to carrying on this work under more favourable and promising conditions.

It has been recommended to me that the Hon. Advisory Council for Scientific and Industrial Research might help in the development of research work with respect to rust, by the provision by that Council of a fair number of fellowships, awarded to promising and qualified students to assist in the solution of concise fundamental problems connected with rust research. Such problems to be worked out in close touch and under the direction of experienced research men in the employ of the Department, and in consultation with the members of the botanical staffs of our western universities.

The Department would, of course, welcome all constructive suggestions from the chairman and members of the proposed Rust Committee of the Research Council, since it is realized that the problem under investigation demands the most careful and stimulating support from all and every source. . . .

COMMENTS ON DR. GRISDALE'S LETTER OF 26 FEB. 1924

. . . A qualified scientist who had studied the proposed plan was of the opinion that no real fundamental research would be accomplished. . . .

It should be pointed out that the Federal Department of Agriculture has at present only one man competent to direct such research, viz. Mr. W. P. Fraser. . . .

TO W. C. MURRAY FROM H. M. TORY, EDMONTON, 18 JULY 1924

. . . You will be glad to know that the Research Council Bill, amended to omit the words "Research Institute", has passed both the Commons and the Senate. We will have to have an early meeting to decide on further policy. I wish I could see you for a little before we go East.

Probably nothing will be done until after the Rust meeting, when we can have a chance to thrash it over.

TO H. M. TORY FROM F. C. HARRISON, MACDONALD COLLEGE, 23 JUNE 1924

Pardon my importunity, but I am writing you again regarding the assistance for investigation of frozen fish. I have by this morning's mail received a letter from Dr. A. G. Huntsman, Director of the Biological Station at St. Andrews. He says in his letter:—

I am sorry to learn that the matter of the investigation of frozen fish has been held up by delay in action by the Research Council. So far as my knowledge goes, the Biological Board has received no communication from the Research Council, but the subject may have been taken up. I believe it to be very important to make certain that this is continued, and in default of the Council taking action, I should like to ascertain from you whether something might not be done at once with the Board backing the project up for the present at least. There would seem to be no objection to this, as the matter of investigation of frozen fish originated on the part of the Board rather than the Research Council. I am able to assure you the transportation and the board of such investigator as you may be able to send down here, and perhaps also $100 or some such remuneration may be arranged, but I should be very glad to learn what prospect such conditions would have of being considered suitable.

This arrangement, however, would bring me no relief, for whilst I could send one of my regular assistants to St. Andrews, to look after this end of the work, I shall need further assistance here to take the samples and make the necessary analyses, etc. on the arrival of the fish in Montreal or other markets for I do not think it would be any use from the practical standpoint, unless this investigation is worked from both ends.

I feel very reluctant to start it unless I have some assurance from the Council that the grant asked for will be given. Of course, I know it is very essential to have the co-operation between the Research Council and the Biological Board. The recent letter from the Chairman of the Biological Board in connection with the lobster enquiry, and the representation of it by the department, is a case where lack of co-operation between these bodies is very evident.

TO A. B. MACALLUM FROM S. P. EAGLESON, OTTAWA, 28 JUNE 1924

. . . Dr. Tory is of the opinion that . . . it is advisable for him to authorize, as Chairman of the Council, the payment of the grant of

$1200 now asked for by Dr. Harrison, in order to enable him to proceed with his investigation during the present summer, and he has instructed me to advise you that, unless, as Chairman of the Standing Committee on Assisted Researches, you veto this proposal, he will take the action indicated and submit the matter to the Council at its next meeting for approval.

As you are aware, Dr. Tory is of the opinion that some definite understanding must be reached between the Research Council and the Biological Board, but, owing to the pressure of other matters, it has been quite impossible as yet for him to take up this question and he does not feel that this fact should be allowed to operate to the detriment of an applicant, who has already rendered extremely valuable service to the Council, especially as any difference of opinion which exists relates to the administration of the work, rather than to the value of the proposed research.

Will you please advise me at your earliest convenience as to your decision in this matter.

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 2 JULY 1924

. . . Dr. Ruttan was very strongly of the opinion that it is essential that a definite arrangement be made with the Biological Board as soon as possible and also that the present grant should be given to Dr. Harrison by the Research Council on the distinct understanding that the work was entirely under the auspices of the Council, and that the grant should not be given in such a way as would enable the Biological Board to claim the credit for work carried out by the Research Council, as has occurred in the past. Both Dr. Ruttan and Dr. Macallum appeared to be convinced that there will inevitably be friction between the two bodies and that in the present case the Council should protect itself by definitely informing the Chairman of the Biological Board as to its intention to proceed with the proposed investigation. . . . This would leave the question of the general relationship of the two organizations to be dealt with upon your return to Ottawa. I have informed Dr. Harrison that action in connection with this application is being taken by the Assisted Researches Committee and that a decision will probably be reached within a few days.

I am enclosing a marked copy of the evidence taken before the Select Standing Committee of the House of Commons on Marine and Fisheries, containing Dr. Knight's* evidence, which, evidently, was the original

*Dr. A. P. Knight, Professor of Biology and Physiology, Queen's University, from 1892 to 1919.—M.W.T.

source of the press reports to which Dr. Harrison objected. You will also note that Dr. Knight minimizes the importance of the work carried out by Dr. Harrison on the blackening of lobster and left the impression that the Biological Board was entitled to quite as much, if not more, credit than the Research Council for the solution of the problem of the blackening of lobster.

TO A. B. MACALLUM FROM H. M. TORY, EDMONTON, 29 JULY 1924

. . . I must confess that the attitude taken by Professor Knight is past my powers of comprehension. . . .

TO H. M. TORY FROM CHARLES CAMSELL, OTTAWA, 4 SEPT. 1924

In a recent report issued by the Research Council on "The Utilization of the Low Grade Iron Ores of Canada" are a number of references to the iron ore deposits on Belcher Islands. It might appear from the report that the Iron Committee was not familiar with the work done by the Geological Survey in 1921 on these deposits and recommends that just such work be done as we have already done. Whether this is the case or not I do not know, but the impression might be left with the reader that the Geological Survey had been remiss in its duty in not investigating these deposits.

I enclose for your consideration a memo on this subject prepared by the Geological Survey.

TO SIR GEORGE GARNEAU FROM H. M. TORY, EDMONTON, 27 DEC. 1924

. . . Frankly, I have not much hope of getting money from the Government this winter to build a laboratory, for the reason that an election will probably be on next summer (of course this is only a guess) and we may have to wait until that is out of the way. I am convinced, however, that the wise thing for us to do is to force the pace by actually starting research work in Ottawa in such accommodation as we can rent. . . .

1925

"An important characteristic of science . . .
is its incapacity to be impractical. The most far-reaching
discoveries and the most widespread useful
applications flow regularly out of ideas that initially
seem abstract and even esoteric. These ideas arise out
of the unguided and free activity of men who
are motivated by curiosity or who, even more generally,
are thinking about scientific problems simply because
they like to. The way in which apparently aimless
curiosity stubbornly refuses to be foolish and
leads to important goals doubtless seems strange or even
incredible to some persons. . . . I think that apparent
impracticality is more generally important than we
are inclined to suppose."—Warren Weaver, 1959

". . . I believe that we need to make statistical
methods part of the education of everyone . . . and only
from statistics can the non-scientist learn to use
averages and approximations with confidence, to be
unafraid of dividing the national debt or the
German battle losses by the population, and to know in
his bones the difference between a million and ten."
—J. Bronowski, 1956

IN 1925 the ultimate relation between science and wealth had become quite clear, in broad outline; but the fact that this relation usually begins in a back-to-back position was as far as ever from being generally understood. Scientists were still strangers, and those who disposed of power—mainly political and financial power—were loath to admit scientists to their own charmed circle. A

reluctant admission that some of their own power depended on what scientists did was as far as they were able to go. In the words of Dael Wolfle (1) about a different time and country, they were "a society that eagerly grabs the fruits of science but does not accept the scientists who produce those fruits."

At this time, salaries of scientists were low and the League of Nations suggested that scientists might share the financial returns from inventions based on scientific work. On this subject, Tory's letter to the Under-Secretary of State* has the same dream-like quality, a wistful desire to find some way of letting a scientist share in the financial rewards of his own discoveries. But this is difficult; the scientist himself is usually first to object, because of his standing on the shoulders of other men. Also it would now be difficult to reward Gregor Mendel, whose great contribution was recognized about thirty years after his death. Something may be done by way of prizes, but in general the gap between discovery and utility is such that a first-rate scientist may count himself fortunate to be recognized and honoured on the basis of usefulness before he is dead. Large financial rewards do not lie on this path. And some find even the recognition a burden, and try to parcel it among their colleagues, assistants, and teachers as well as among their forerunners who opened the way. For the most part, in both the arts and the sciences, virtue seems to be its own reward. And this is not so bad: self-realization is better than recognition. No reward conceivable by his fellows is better than *having been* Newton or Faraday or Einstein. And although recognition—and money also, if it is to be had—are certainly to be desired, Gregor Mendel died a full man, not an empty one, and had some measure of satisfaction in the joy of his own discovery.

The League's proposal produced no discernible result, but whatever the merits of the original proposal, Tory's spirited reply* to the criticism of his hostile Minister* is wholly admirable.

The Hon. T. A. Low never did understand that the National Research Council was not part and parcel of the Department of Trade and Commerce. Indeed, he stated categorically that the NRC was "under this Department."* Apparently he had never read the NRC Act or, if he had, it was merely as an eye-swivelling exercise.

*Document quoted in this volume.

His deputy minister gave evidence that he had not read the Act.* Some excuse for Low's confusion lay in the fact that the vote passed each year for the work of the Council was placed in the estimates as an item under Trade and Commerce, an arrangement found convenient by Foster and Macallum in 1917.* Eagleson suggested that this vote now be entered in the estimates as a grant to the Research Council itself, as an aid to ministerial understanding that the Council operated under its own Act.* Ministers had to read the estimates. Tory did not think that this would be a wise move under the circumstances, but thought it might be done later.

Low appointed a member of the Council, which the Act gave the Privy Council Committee legal power to do. However, he did not hesitate to force an appointment to an associate committee of the Council (2), which was a clear case of meddling in affairs that he did not understand (3). He would not permit the Associate Committee on Tuberculosis Research to hold its first meeting until his own nominee had been appointed to membership on that committee (4).

The research on magnesite was the first laboratory project to be undertaken directly by Council staff. This began in a request by the industry for the aid of the acting Minister of Finance, the Hon. James Robb, who suggested using the NRC.

In 1925 Dr. Frank E. Lathe was made technical assistant to the president. He was a chemist and metallurgist who had served as chief chemist to the Chile Exploration Co. and with the British American Nickel Corporation.

Tory seized eagerly upon the magnesite problem to prove what research might be able to do for industry and set Frank Lathe immediately to work. Now was the appointed time. If a man of Lathe's experience, grasp, and single-minded devotion could not crack this problem, then it would be the sheer bad luck of hitting an unusually difficult one. The chance had to be taken. Lathe, with his usual energy and thoroughness, came through very quickly with hopeful results (5).

Low's interest seems to have been mainly in the marketing aspect of this problem, and he regarded the Council as a useful way of hiring a salesman for magnesite products, who could then be transferred to the Commercial Intelligence Branch without having to go through the Civil Service Commission. He had in mind "a very fine young chap," etc.* Since the man was technically compe-

tent, and his association with the NRC was limited to a few months, no objection was raised by Tory (6).

Macallum had often begun his letters by saying he was sorry about the delay in answering, but he had been too busy for any but the more important topics that came under his notice by mail. This put his correspondent into the position of having bothered a busy man with relatively trivial matters, to which he was finally ready to give attention. Tory sometimes did this too, but not when his correspondent was an irate Minister thirsting for his blood. Then the delay in answering was "because the matter is of such importance that I wanted to give it the most mature consideration."*

During 1925, Tory flirted openly with the notion of a government department of Science, Industry, and Commerce.* Fortunately, nothing came of this idea. Had such a department been created, NRC activities would have been placed in a departmental straitjacket, probably under a Minister with the grasp of science displayed by Mr. Low in the following letter:

TO S. P. EAGLESON FROM THOS. A. LOW, OTTAWA, 23 JUNE 1925

I return herewith, initialled and approved, the list of awards for fellowships, studentships and bursaries for the academic year 1925–26.

In view of the discussion in the House of Commons when our estimates were under consideration for this item, I think it might be well for the committee on awards to consider the distribution of these scholarships in future in more equal groups to the different universities. Almost all these awards are held at one or two universities. I note also that they are nearly all held in one branch of science. At the present time I would like to see more held in Biology, Agricultural Bacteriology, and Plant Biochemistry. The question of scientific research along the lines of our various cereals and problems of re-forestation are very vitally connected with national prosperity. It also strikes me that it might be worth considering whether a few more of the awards might not go to some of the younger students who have never had a chance on research, rather than the majority going to those who have already been given a special opportunity. These are points, however, which I do not press, but merely raise for the consideration of the committee.

In fact, 56 awards were recommended, to be held at 10 Canadian universities in 14 different fields of science. These 56 grantees had received their undergraduate training in 16 different universities.

The statistics are amusing. After giving the Hon. Mr. Low the benefit of all doubts—deciding that "one or two universities" means Toronto and McGill, and assuming that "one branch of science" refers to all five branches of chemistry listed, including his own preferred branch of plant biochemistry—it turns out that his phrase "almost all" actually means three-quarters (74%) and "nearly all" equals one-half (53%).

One might hope that the Minister of the Crown who includes speaking for science as one of his duties would not habitually regard 53 per cent of something as nearly all of it. However, there may be some excuse for a Minister of Trade and Commerce, used to the idea that if a can contains 49 per cent water and the rest chicken, it is canned chicken; but if it contains 51 per cent water, it is chicken soup.

The Council, of course, was happy to have most of its awards held in the best-equipped schools of research, by the best young people available. They insisted on quality and knew what to look for: proof of research ability. If the Hon. Mr. Low's suggestion had been followed, to give more of the awards to "some of the younger students who have never had a chance on research," the people thus displaced from the list for 1925–26 might have included J. O. Wilhelm (later Director of the Ontario Research Council) and E. W. R. Steacie (later President of the National Research Council). But the Council members did not accept the suggestions in this letter (7), since "so to do," in Tory's habitual phrase, would have been to reverse the clear current of their duty.

This letter from Mr. Low shows that the modern dilemma about science had already begun to harden, even in 1925. On the one hand, in the military analogy about war being too important to be left to the generals, science was becoming too important to be left entirely in the hands of scientists. On the other hand, in this discussion it is obvious that the members of the House of Commons had no idea what they were talking about, even in so comparatively human a matter as scientific scholarships. The only possible intelligent course to follow was to trust the scientists, and to hope that at least *they* knew what they were talking about.

One helpful way out of this dilemma is to have our elected representatives know enough about science to make reasonably

intelligent decisions on scientific matters. This implies educating the entire public in at least the essentials of scientific method, scientific history, scientific outlook—something that is still glimmering hopefully in the distance forty years after this letter was written.

It is difficult to reconcile Tory's grasp of the necessity of freedom for research so clearly shown in his wording of the NRC Act of 1924 with this idea, a year or so later, of a government department of science.

Under the Act the necessary control over the NRC was exerted by a Committee of the Privy Council. In practice this often meant dealing with a single Minister, *but only in his capacity as Chairman of this Privy Council Committee*. By and large, this dealing at arm's length worked out very well. Variation in the quality of understanding shown by the various chairmen, inevitable under a democratic system, was ameliorated by this device. The Act let through all of the wisdom and understanding that were sometimes available in abundance, but it dampered the ministerial bullying associated with lack of understanding.

Tory, wrapped in the Act of 1924, was able to endure the bullying of several chairmen and to enjoy the confidence of several others, without faltering in the quality of his work. But the department that he proposed in 1925 would have left a proud and impatient man naked, exposed to the withering influence of the first "poor" Minister that fell to his lot. It is a strange aberration in a man who was usually clear-sighted.

REFERENCES

1. Dael Wolfle, "Science and Public Understanding," *Science*, 125 (Feb. 1957), 179–82.

2. Letter A, T. A. Low to H. M. Tory, May 1, 1925. NRC Papers, National Science Library.

3. Letter B, T. A. Low to H. M. Tory, May 1, 1925. NRC Papers, National Science Library.

4. Telegram, S. P. Eagleson to H. M. Tory, May 4, 1925. NRC Papers, National Science Library.
5. Exhibit C, 65th Meeting, NRC, Dec. 17, 1925.
6. Letter, H. M. Tory to T. A. Low, July 17, 1925. NRC Papers, National Science Library.
7. Item 2, Exhibit G, 64th Meeting, NRC, Oct. 24, 1925.

DOCUMENTS

RELATIONS WITH GOVERNMENT

TO THE UNDER-SECRETARY OF STATE FOR EXTERNAL AFFAIRS FROM H. M. TORY, EDMONTON, 23 DEC. 1924

In reference to your letter of November 24th, 1924, and the previous documents relating to the report by Senator Ruffini of the Sub-Committee on Intellectual Property of the Committee on Intellectual Co-operation of the League of Nations. . . .

The Research Council approves of the general principle of the proposals set out in Senator Ruffini's report in regard to the protection of scientific property, viz., that work which has resulted in valuable scientific discovery should be recognized by an adequate share in the financial returns arising from the discovery.

The Research Council is of the opinion that, up to the present time, the worker whose special mental aptitude has resulted in invention has profited at the expense of the worker whose special aptitude has resulted in scientific discovery and, further, that the whole weight of argument in the past has leaned toward the protection of the pure industrialist, with little consideration for the intellectual worker.

At the present time it would seem to be generally assumed that the industrialist has prior rights to consideration over the pure scientist, entirely overlooking the fact that, without the basic work of the pure scientist, there would be no profit for the industrialist. Generally speaking, it can be asserted without fear of successful contradiction that the discovery of scientific principles requires a greater expenditure of time

and intellectual effort than is required in perfecting and applying the inventions based on the discovery. In considering the above opinion, a clear distinction should be drawn between the conception of abstract ideas, which may be mere matters of opinion or literary forms, and the discovery of scientific principles. It is hardly necessary to emphasize the fact that the entire industrial structure of the modern world is based on and dependent upon the discovery of such principles.

With regard to the complications, which it is generally assumed would result from the recognition of the rights suggested, the Research Council believes that these complications necessitate the establishment of uniform laws as between countries, in order to equalize the industrial effect, and is of the opinion that, if uniform laws were adopted, industry would not be adversely affected.

The Research Council is further of the opinion that regulations could be made that would remove all uncertainty in connection with the industrial development of an invention based upon a scientific discovery by having fixed, as between the patentee of an invention and those interested in its industrial exploitation, the royalties to be paid, later discussion to be concerned only with the division of royalties as between the patentee and the scientist.

Further the Research Council is of the opinion that recognition of the fact that the scientist has a right to reasonable compensation, in return for his contribution, would not in any way adversely affect his interest in pure scientific endeavour, but it would without doubt help to counteract the present-day tendency to draw away the best minds from the work of pure science into the mere inventional work of industry.

In conclusion, attention is drawn to the fact that only general principles are dealt with in this communication. When detailed proposals are submitted for consideration, the Research Council will be glad to make a more intimate study of the entire subject.

TO H. M. TORY FROM THOS. A. LOW, OTTAWA, 7 JAN. 1925

Re: Recommendations League of Nations on Scientific Discovery

Were the suggestions made by you in your letter to the Department of External Affairs on this matter carried out, it would prove a very serious matter for inventors, patentees and all industrialists in this country.

In view of the attitude adopted by the British Government in this connection and because of the above consideration, I cannot endorse the opinion which you have given nor do I hold the same views on the

matter as expressed in your letter on behalf of the Council. I am therefore sending a copy of this communication to the Under-Secretary of State for External Affairs.

TO THOS. A. LOW FROM H. M. TORY, EDMONTON, 23 JAN. 1925

Re: Recommendations League of Nations on Scientific Discovery

Your letter of January 7th on the above subject followed me to Edmonton. I am afraid judging from its content that you have not quite appreciated the point of view set forth in the memorandum which I prepared for the Under-Secretary of State for External Affairs.

In the first place, no suggestion has been made that industry and invention already accomplished should be in any way interfered with and therefore the whole question of the recognition of scientific work affecting the *present* industrial situation of Canada or any other country is not under discussion at all.

As I understand the situation, the Committee on Intellectual Co-operation of the League of Nations is making an effort, looking to the future, to secure a more rational system of recognition of scientific work than has heretofore been common, with a view to stimulating that kind of research which will be for the benefit of mankind. They see that if the situation created by present laws is not to be rendered more difficult, some uniform practice in regard to the matter should be established as among the nations of the League. This point of view I have emphasized in the fifth paragraph of my memorandum.

With regard to the view adopted by the British authorities in this connection, it had not occurred to me that we would be expected necessarily to conform to their view. I can only say that I read carefully their memorandum and consider it an exceedingly conservative document and one with which I am in total disagreement. It was surely prepared by persons whose interests were not scientific. If you will read what was said by the British Industrial authorities at the time the patent laws were passed, a hundred years ago, you will find their opinions almost identical with what is now said about the recognition of science generally, viz., that industry would be interfered with and the industrial workers suffer. The fact is that exactly the opposite occurred. The establishment of the patent laws stimulated at once the ingenuity of men interested in that sort of intellectual effort with the result that industry received an enormous impetus and the cost of production in hundreds of ways greatly reduced. I am confident that the same thing would happen, if some

reasonable plan for recognising pure science was adopted, viz., that men of the right scientific turn of mind would be stimulated to undertake scientific work because they would be permitted to share to some extent the rewards of their labours. It seems to me that it would be well worth while making the effort to see whether some rational scheme could not be devised rather than to take the conservative attitude that things are satisfactory as they are. Should the effort fail and the thing be found impracticable, no harm would be done and at least the facts gathered in connection with the study would be valuable. Frankly, so far as my own judgment goes, the memorandum which I sent to the Under-Secretary of State for External Affairs stands.

TO H. M. TORY FROM THOS. A. LOW, OTTAWA, 29 JAN. 1925

Acknowledging receipt of your letter of January 23rd, may I say that you have quite misunderstood my point of view, if you think that I interpret the recommendations of the League of Nations on Scientific Discovery as applying to inventions already established.

Possibly if I illustrate by typical example, you would understand why I think it would be very disastrous for Canada to give its approval to this suggestion in its present form. Let us suppose for the sake of argument that a chemist working in the research laboratory of one of our pulp companies discovered a certain chemical process which would be of considerable practical value in the manufacture of paper. The company for which he is working applies for patent and has the process protected. The company then undertakes the expansion of business and builds up trade and a profitable business on the basis of this process. Perhaps thirty or forty years from now the estate of some scientist who is at the present time working in a small laboratory in Russia or Austria-Hungary finds a process discovered at a prior date and described possibly in a remote technical publication of that country really anticipated the scientific idea arrived at by the Canadian chemist working separately and independently. Immediately the estate of this scientist, or the scientist if he is still living, will lay claim to the principle. Were the recommendations suggested by the League of Nations then in force and were it proved that in some publication, however remote, publicity had been given to the invention or scientific idea involved, the Canadian company would be subject to heavy compensation during the lifetime of the scientist and for fifty years thereafter.

I have no objection certainly to Canada thinking independently but I do think that when the greatest of the industrials in the League, and

at that a nation not unfavourably known for its scientific research, has declined to subscribe to such a recommendation, Canada, much less established and with a great deal more to lose, should not undertake to subscribe to this recommendation until it has received much more thorough examination by all the factors concerned.

As I think I stated before, the matter is one that does not concern only the Research Council in this Department* but concerns very vitally our whole Patent Branch and Canadian industrial invention. I think, therefore, that it is only fair to suggest that in matters of this kind recommendations should not go forward which are really associated with the name of this Department until the various Branches concerned have discussed the matter.

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 17 JAN. 1925

Last Thursday afternoon, Mr. Pratt phoned, inquiring what had been done regarding the appointment of Mr. Cory† to the Research Council. I was so amazed at the inquiry that I was, for a moment, at a loss as to what reply I should make and probably because of my hesitation, Pratt went on to explain that he understood that Mr. Stewart had discussed the question with you. I immediately replied that I was unaware as to the effect of any discussion which you might have had on this subject with Mr. Stewart, but, so far as I knew, no official action had been taken as yet regarding Mr. Cory's appointment to the Council.

I thought it wise to let you know about this inquiry. Evidently Mr. Cory is very much concerned over the fact that he has been left out in the cold.

TO S. P. EAGLESON FROM H. M. TORY, EDMONTON, 22 JAN. 1925

With regard to Cory, your position is to be one of entire ignorance of what happened except that you know that Mr. Stewart and I discussed the matter.

TO F. C. T. O'HARA (DEPUTY MINISTER OF TRADE AND COMMERCE) FROM S. P. EAGLESON, OTTAWA, 5 FEB. 1925

In reply to your letter of February 2nd, your file 15343, in which you state that the Research Council is required to have laid on the table of the House a statement of receipts and expenditures "within the first

*The NRC was not "in" this or any other Department.—M.W.T.
†Deputy Minister, Department of the Interior.—M.W.T.

fifteen days" and a report of the Council "during session", I would call your attention to the fact that, while these were the requirements under the old Research Council Act, under Section 13 (2) of the Research Council Act passed at the last session of Parliament, a copy of which I enclose herewith, the requirements in this respect have been slightly changed. Under the above Act, the report of the Research Council, containing a statement of receipts and expenditures of the Council during the preceding fiscal year "shall be printed and laid before Parliament within fifteen days of the making thereof, or, if Parliament is not then in session, within fifteen days after the commencement of the next session of Parliament."

TO COL. F. M. GAUDET FROM J. S. WOODSWORTH (LEADER, C.C.F. PARTY), OTTAWA, 3 FEB. 1925

I desire to obtain some information regarding results of research work in industry generally, particularly as it affects (1) profits arising from enterprise, (2) economics affected and the reductions in cost, (3) the effect of such economies etc., upon the number of people employed.

My object in view is derived from the fact that science, invention, improvements in organization, etc., are creating economies in industry generally, reducing the cost of production and distribution, but at the same time reducing the number of people employed.

I should be thankful to derive the benefit from the abundance of your experience in this particular.

TO J. S. WOODSWORTH FROM COL. F. M. GAUDET, OTTAWA, 11 FEB. 1925

. . . Unfortunately, scientific research is not as yet widely employed in Canadian industry and it, therefore, is obvious that it cannot fairly be charged with adversely affecting the position of the worker in Canada. Less than ten years ago, it was estimated that less than $100,000 was expended annually by Government laboratories for scientific research. In 1917, the Research Council issued a questionnaire to the industries and replies received from 2400 of the leading firms in Canada show that, of this number, only 37 firms had laboratories for research and employed 37 research directors and 124 assistants. Eighty-three firms employed as many investigators and 276 assistants, but the great majority of these were engaged only in routine examinations. Apart from salaries, the total amount expended in 1916 for research by all firms listed did not exceed $135,000.

The general application of scientific research to Canadian industry would not only increase the quantity, but would also improve the quality of goods, without unduly increasing the cost of manufacture. It would also make possible the production in Canada of goods and materials which we cannot at present produce in competition with other countries. This would result not only in enabling Canada to reduce her import expenditures by utilizing by-products and developing natural resources now lying dormant, but also to increase and extend her export trade. By way of illustration, I might mention only two investigations which have been undertaken by the Research Council.

. . . The lobster canning industry . . . the utilization of Canadian iron ores . . .

It is a question worthy of your careful consideration whether Canada, with the greatest wealth of raw materials, can afford to lag behind all other great industrial nations in the application of scientific research to her industries and natural resources and whether Canadian goods can continue indefinitely to compete in foreign markets with goods from countries where adequate attention is now being given to the application of research to industrial problems. I am satisfied that a thorough investigation of this question will convince you that scientific research can not only stimulate Canadian industry, but can improve the condition of the worker in Canada.

MEMORANDUM RE REPRESENTATION ON RESEARCH COUNCIL BY J. A. MCCLELLAND, VICE-PRESIDENT, INTERNATIONAL ASSOCIATION OF MACHINISTS, 10 FEB. 1925

The question of Labor representation on the Council of Scientific and Industrial research is one in which we have been much interested for a number of years. During 1919, the Trades and Labor Congress was given a representative on the Associate Committee on Industrial Fatigue which operated under the guidance of the Council on Scientific and Industrial research. The work of this committee is no doubt known to you. During the year 1920 and the early part of 1921, a number of investigations were conducted in all leading industries and some valuable data secured dealing with the possibilities of improvements in hygienic requirements in industrial plants. Investigations were also carried on and much research work done on industrial fatigue and occupational diseases in regard to which Report No. 7 of this Committee stated:—

On the whole we are forced to the conclusion that there is general lack of recognition of the occupational factor in disease. It seems incredible that the position in Toronto should differ so widely from common experience in

the States, where occupational disease is recognized as a general problem. This is evidenced by, among other things, the existence of special occupational disease sections in hospitals, fed from industrial clinics, and by the fact that 650 different types of such diseases have been identified.

Unfortunately, when in the midst of this work, the appropriations were cut down and it was unable to continue and eventually the number of the members of the committee was reduced to a few and even they ceased to have any further meetings.

In April, 1922, representations were made to the Prime Minister by the Trades and Labor Congress for direct representation of Labor on the Advisory Council for Scientific and Industrial research which was then under consideration of re-organization. It was pointed out that Labor was not unmindful of the necessity of every effort being made to provide improved means of developing the manufacture of raw materials of this country and at the same time that we did not think that the questions of hygiene, industrial fatigue, occupational diseases, etc., should be ignored. The Prime Minister apparently agreed with the representations made as the following letter sent in reply demonstrates:—

You will need no assurance, I know, of my warm sympathy with the point of view you have emphasized in your letter of the 20th instant, as to the desirability of having future industrial research work relate to conditions under which industrial workers are employed, as well as to the more material aspects to which you have referred. Before anything is done to complete the personnel of any Federal Research Institute, you may be sure that the suggestion you have made, as to the inclusion of a representative of labor, will be carefully borne in mind by my colleagues and myself. The whole subject is one in which I am particularly interested and it will give me more than ordinary pleasure to see that it receives due weight when the matter comes up for consideration.

During the last session of Parliament the Act of 1917 establishing the Research Council was repealed and a new Act passed providing for the Honorary Advisory Council for Scientific and Industrial Research. The Act provides for the appointment of fifteen members by the Governor-in-Council.

The position taken by organized labor on the question of representation is, in short, that while it is important that labor should be represented on any committee appointed to consider research work having any reference to conditions under which Industrial Workers are employed, it is equally important that we should have representation on the directing Body, which is responsible for the general conduct of the affairs of the Research Institute.*

*From this time on labour was represented, starting with McClelland himself.—M.W.T.

May we hope that you will give this matter your sympathetic consideration and so arrange your appointments that labor will be placed in the position of assuming its full share of responsibility in this important National undertaking.

TO H. M. TORY FROM THOS. A. LOW, OTTAWA, 6 JULY 1925

In reference to the discussion of the amendments to the Grain Act for the establishment of protein, milling and baking tests along certain lines, may I say that I am agreeable to carrying out some such work as has been advocated, following largely the lines outlined in the joint report on Bichard's* report which your Council was good enough to have prepared for me. . . .

Would you please let me know what you think and if possible give me one or two names? I am prepared to give my support and the necessary staff to a man who is capable of organizing the work along the lines suggested.

TO THOS. A. LOW FROM H. M. TORY, EDMONTON, 28 JULY 1925

I regret that I was unable to see you on my way West to discuss further with you the question of the wheat researches. I brought your letter of July 6th home with me because the matter is of such importance that I wanted to give it the most mature consideration.

I have not yet been able to get in touch with either of the men who assisted me in making the previous report as they are both on holidays and will not be available for some little time for a discussion of the matter. I fear however it would be useless to approach either of them with a view to taking a post under the Grain Board as they are both heads of large university departments† and have work under their control which I think they would regard as equal or more important than the grain research.

I would strongly urge before any further action be taken that a definite programme of the necessary research be laid down in order that the selection of the man to carry on work might be made in view of the problems to be faced as a whole. After the scheme had been decided upon we could then definitely decide whether it was necessary to carry on the researches in the university centres or to establish a centre under

*Dr. F. J. Birchard, Chemist, Dominion Grain Research Laboratory, Winnipeg, Man.—M.W.T.

†Dr. Robert Newton, Professor of Field Husbandry, University of Alberta, and Dr. G. S. Whitby, Professor of Inorganic Chemistry, McGill University.—M.W.T.

the direction of the Grain Commission. Frankly I do not believe we can get the men we want to do the work set off by themselves in a laboratory at Winnipeg. The problem demands such careful study that it would be better done where the person who is in charge has an opportunity of constant contact for the purpose of discussion with other men following similar lines of work. I would suggest that, unless the matter is exceedingly pressing, you give me time to thoroughly plan the programme of studies that should be undertaken. I will then submit it to you for approval and in the light of the requirements we can decide the best method of caring for them. This would necessitate some little time before a decision can be made, as I must have an opportunity of discussing the problems with those who have been studying them more intimately and making myself acquainted with what is now being done in the American laboratories. . . .

TO H. M. TORY FROM THOS. A. LOW, OTTAWA, 7 AUG. 1925

I acknowledge the receipt of your letter of July 28th and in view of the great importance of the matter, I agree with you that it would be well to make a thorough study of it before embarking upon any definite program. And also, in view of the fact that there is a possibility of a general election, I don't think it would be wise for me to proceed to reorganize the laboratory at Winnipeg at the present time and will allow the matter to stand until probably the end of October, or sometime in November.

TO W. C. MURRAY FROM H. M. TORY, EDMONTON, 23 NOV. 1925

You will remember that last year at the meeting of the Universities Conference, authority was given to me to ask the Research Council to convene a meeting of the western biologists for the purpose of submitting a programme of researches and studies in conneetion with western Canadian problems. At the last meeting of the Research Counеil this permission was granted and I propose at an early date to call the conference together. While the men in agronomy were the persons I had mostly in mind, I think we might make it a little wider than that and ask the agronomists, the botanists and perhaps the entomologists, say one representative from each group from each university. This would give a conference of nine in addition to yourself, myself and McLean,* if he will attend.

*President, University of Manitoba.—M.W.T.

Further, before the election, the Minister of Trade and Commerce had agreed that I should ask a small committee of biochemists to confer with me over the question of the grading of grain by protein content. Since I had the discussion with the Minister of Trade and Commerce, I have had a complete review made of all the literature on the subject to date so as to get a statement of the present state of that investigation. I find that the matter is in a very uncertain and indefinite state and that further investigation must be undertaken, if anything sensible is to be done. In the meantime, a lot of loose talk has been going on about it. I am convinced now that the problem cannot be solved in the laboratories in Winnipeg. A routine man will have to be got in the office at Winnipeg. Birchard, himself, is entirely unequal to the task. A definite study of projects in connection with the work should be planned and carried out in the universities, if men in the universities can be found to undertake them. I do not know whether the change at Ottawa is likely to affect adversely this plan. When in Ottawa for the next meeting of the Research Council I will find out whether to go on with it or not. In that case we might have the grain problem discussed at the same meeting as the other.

The object of the conference will be twofold:

1st. To set out a group of biological problems which we would like to see solved in the interests of western agriculture generally.

2nd. To plan a definite course of preparation for men who would be trained to undertake such problems for the purpose of seeing whether such training could be given in Canada.

I should like you to get your biological men together and have them do some preliminary thinking on the subject, and if possible, have the head of the department come prepared with problems and suggestions....

TO NORTH AMERICAN MAGNESITE COMPANY FROM H. M. TORY, OTTAWA, 17 MARCH 1925

The bearer of this note is Mr. Frank E. Lathe of the National Research Council, Ottawa. I received a note from the Honourable Mr. Robb, asking me to inquire with regard to research work in connection with the magnesite industry at Grenville. In order to get immediate and definite information about what is required, I have asked Mr. Lathe to visit you and through a personal interview to get at such facts as you wish to place before us. For the purpose of the interview, would you be good enough to take him into your full confidence and any communications which you give to us will be treated confidentially, if you wish

us so to do. Mr. Lathe is a metallurgist and will fully appreciate any information which you may wish to give him.

TO THE HON. JAMES A. ROBB FROM H. M. TORY, OTTAWA, 28 MARCH 1925

Immediately on receipt of your request regarding the Magnesite Company's difficulties at Grenville, I sent Mr. Frank E. Lathe, a metallurgist who is at present working with the Research Council down to Grenville to look the situation over. He spent an entire day with representatives of the Company and discussed with them the various problems with which they are confronted. As a result, he is of the opinion that there is a reasonable chance of solving some of the technical problems involved and, consequently, brought samples back to Ottawa, in order that preliminary tests might be undertaken. These have been carried out by Mr. Lathe in the Laboratories of the Department of Mines through the courtesy of that Department and although there has not been sufficient time to carry out tests which would permit of any final conclusion, the investigations so far indicate hopeful possibilities.

I considered it advisable to bring this question to the attention of the Research Councl at its meeting held a few days ago and after careful consideration of the information available, the Council unanimously resolved "that in the opinion of the National Research Council, it is desirable that an investigation be made of Canadian magnesite with a view to its practical utilization in Canadian industries, for which investigation the Research Council will be willing to accept responsibility and expend such sums as may be voted therefore, and that the President of the Council and Drs. Camsell and Clark be appointed a Sub-Committee to undertake the responsibility for the control of this work."

As indicated by the personnel of the Sub-Committee named above, the Research Council and the Mines Department have arranged to co-operate in the carrying out of any investigation which the Government may consider to be advisable in connection with this industry. Before any large expenditures are incurred, further experiments will, of course, be carried out, in order definitely to confirm the results of the preliminary experiments already made.

TO H. M. TORY FROM THOS. A. LOW, OTTAWA, 4 JULY 1925

I enclose herewith copy of a letter received by the Honourable Mr. Robb of March 19th, from the Magnesite Companies of Canada. . . . I

am disposed to agree with this, providing that we can make our own appointment of the man to whom we would entrust this important work of pushing the product in the United States and Canada. It has occurred to me that if we took a man and made an appointment under the Research Council, putting him in with Mr. Lathe for two or three months and having him spend some of his time in the plants at Magnesite and Grenville, we could make the appointment independently of the Commission. Then when we had worked out an arrangement between the Council and the Commercial Intelligence Branch, we could transfer this man to a permanent promotion office in the Commercial Intelligence Branch itself. Would you let me know what you think of such a proposition?

I have in mind a very fine young chap, energetic and thoroughly equipped. He is a graduate in mining and metallurgy, and a prize man in metallurgy. . . . I know him quite well personally. . . . Would you please let me know what you think of the proposition and whether you would be prepared to arrange with Mr. Lathe to look after the early stages of the appointment through the Research Council.

TO H. M. TORY FROM THOS. A. LOW, OTTAWA, 17 MARCH 1925

I am returning herewith list No. 51, grants for research, duly approved. I would, however, direct your attention to Item 134. This evidently contemplates expenditure by this Special Committee on Tuberculosis. At the present time huge sums are being spent annually on this problem of Bovine Tuberculosis by the Department of Agriculture. In addition Parliament makes a grant of $20,000 per annum to the Canadian Tuberculosis Association. I think therefore that it would be well to take this matter of any new expenditure or departure under very careful consideration before it is embarked on. I would recommend that it might be wise to add Dr. R. E. Wodehouse, General Secretary of the Canadian Tuberculosis Association to your Committee of the Council on this subject if he is not already a member. He is at present in Europe on some research work on this problem. Also, in view of the constant overlapping we have on these matters, I wish that before utilizing this grant you would be good enough to let me know the definite nature of the work which it is proposed to undertake.

TO THOS. A. LOW FROM H. M. TORY, EDMONTON, 13 MAY 1925

. . . The question of tuberculosis research came to the Research Council through a series of resolutions regarding research in the field

of bovine tuberculosis. Within the last twelve months at least a score of resolutions were passed by live stock associations all over Canada, asking that the Research Council be authorized to take up the matter. Deputations waited upon the Prime Minister when he was in Western Canada with regard to it. Before taking any action, I looked carefully into the whole subject and find that there was not any research work being done in bovine tuberculosis, excepting a very small amount by Dr. Watson who was exceedingly anxious to have the scope of the work enlarged to make it somewhat comprehensive of the needs of the country. Whole herds of pure bred stock have been destroyed under the present regulations for the destruction of tuberculous cattle and it seemed necessary that at least a complete survey of the field should be taken to determine if the outlook was such that definite action was warranted. A full discussion of the whole matter took place with Dr. Grisdale and Dr. Watson, who is conducting the work. A small committee was appointed to report on the wisdom of any action being taken by the Research Council. When this committee met the question of the relation of bovine and human tuberculosis was discussed and it seemed almost foolish to press the bovine tuberculosis unless there was carried with it an enquiry into the state of the problem at present in the human field as the two are so closely allied.

If there is any research work being done other than preventative work in any department of the government at Ottawa, then I have been misinformed, as I was very careful to enquire about it.

As you doubtless know, the losses from tuberculosis in Canada are enormous both on the animal and human side. On the other hand, in the past few years, such scientific progress has been made in the study of tuberculosis that it seems possible it might be mastered if a cooperative scientific effort were made. It was this belief on the part of the Research Council which caused them finally to agree to form a committee to work conjointly with the Department of Agriculture in connection with the matter.* However, we can go into details when I see you.

*The work on tuberculosis research went on for many years, particularly on the use of a vaccine called "BCG," in which the "C" stands for Calmette, who originated the vaccine. In 1965 it was found that this vaccine, intended as a weapon against tuberculosis, held considerable promise of being effective in preventing certain kinds of leprosy; indeed, one large study involving 16,000 patients, under the guidance of Britain's Medical Research Council, showed that BCG vaccination reduced the incidence of leprosy in humans by 80 per cent. More work is necessary to test how long the immunity lasts. This hopeful report was announced in the BBC External Services Productions for December 31, 1965.—M.W.T.

TO THOS. WICKETT FROM THOS. A. LOW, OTTAWA, 27 APRIL 1925

Your letter of April 22nd with enclosed clipping has been referred to my attention by the Prime Minister, as the Honorary Advisory Council for Scientific and Industrial Research* is under this Department. I am taking the matter up with Dr. Tory.

TO THOS. A. LOW FROM H. M. TORY, EDMONTON, 13 MAY 1925

I have received a copy of the communications from Dr. Thomas Wickett of Hamilton to the Prime Minister with regard to the encouragement of scientific and industrial research. I beg to say that the questions raised in Dr. Wickett's letter have already been repeatedly before the Research Council and the Government of Canada. You will recall that in 1921 a special parliamentary report was made on the subject. I do not think there is anything that I can say that could be used in replying to Dr. Wickett other than to express my judgment that the time is not far distant when we shall be forced into a more active study of the relation of science to the industrial life of the country if Canada is to hold her place in industrial competition.

RELATIONS WITH CONTROL AGENCIES

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 22 JAN. 1925

. . . The Research Council was established late in 1916 by Order in Council, under which it operated until the first Research Council Act was passed during the summer of 1917. During this period, the Research Council was financed by the Department of Trade and Commerce. After the Research Council had been established by act of Parliament, it was agreed between Dr. Macallum, Chairman of the Council, and Sir George Foster, who was then Chairman of the Committee of the Privy Council on Research, to continue to utilize the facilities of the Accounts Division of the Department of Trade and Commerce, in order to draw upon the vote passed each year for the work of the Council and this practice has been continued to the present time, the vote being placed in the Estimates each year as an item in the Trade & Commerce estimates.

The advantages of having the Research Council appropriation given to the Council as a grant outright are obvious and if any endeavour is

*Short title: National Research Council.—M.W.T.

to be made to have a change made, it would seem that the plea for such a change could most easily be based on the fact that the Council is now operating under its own Act, stressing the importance of having the work of the Council completely divorced from any Government Department. You will know, however, whether or not it is advisable to take any action in this connection.

TO S. P. EAGLESON FROM H. M. TORY, EDMONTON, 25 JAN. 1925

With regard to the grant to the Research Council, I think I would just let the matter stand as it is for the moment. We can discuss plans later.

TO S. P. EAGLESON FROM F. A. ACLAND (KING'S PRINTER), OTTAWA, 5 AUG. 1925

Re Requisition 1247—July 29th—58 periodicals

I have before me your requisition as above. You will be aware of the special instructions under which this Department works with respect to these matters and the necessity of preventing the growth of subscriptions lists to what may appear to be an abnormal length.

I notice that you have in the present case added the names of many new periodicals. Kindly let me have a memorandum showing the use made of the fifty-eight periodicals which it is proposed to purchase.

It has been pointed out to me by the Supervisor of Government publications whose special duty it is to watch these matters, that none of the members of your Council live in the Capital and none would therefore have access to the publications in question.

Kindly let me have a memorandum which will indicate the use made of the publications in question, also of the considerable number of volumes ordered at the same time on separate requisition. The Government Committee on Printing and Stationery holds us to strict account for the proper control of these matters, and any memorandum you may be good enough to furnish on this point will be submitted to that body for consideration should occasion arise.

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 6 AUG. 1925

. . . This letter forces us to decide the policy which is to be adopted to govern our dealings with the King's Printer. I assume that you will not consider it advisable to admit that officials of the Department of Public Printing and Stationery have any right to question the judgment

of the Research Council in such matters. Consequently, two courses remain open—either we can send them a copy of the ruling from the Department of Justice, at the same time advising them as nicely as possible that the Research Council must itself decide as to its requirements, or, on the other hand, we can simply ask them to cancel the requisition and order the publications elsewhere. Personally, I am of the opinion that the quietest and most effective way of dealing with the situation would probably be to instruct them to cancel both requisitions and order these books and periodicals through another agent. This would settle the matter. . . .

I would suggest that we should adopt the general policy so far as the Department of Public Printing and Stationery is concerned, of giving them an opportunity to do our printing and stationery business, provided they carry it out expeditiously and satisfactorily, but that if anything savoring of obstruction tactics should be adopted by the Department, as in the present case, we should immediately quietly cancel our requisition and place the order elsewhere. . . .

TO S. P. EAGLESON FROM W. STUART EDWARDS (DEPUTY MINISTER OF JUSTICE), OTTAWA, 8 JUNE 1925

Referring to your letter of the 25th ultimo asking as to the obligations of the Research Council in respect of the Department of Public Printing and Stationery, I have the honour to state that the Public Printing and Stationery Act does not apply to the publications provided for by the Council, that is it has no application whatever to the operations of the Research Council.

RELATIONS WITH GOVERNMENT DEPARTMENTS

TO H. M. TORY FROM F. E. LATHE, OTTAWA, 13 AUG. 1925

For some time I have been interested in the effect of ultra-violet light on growth and disease, and have communicated with Prof. Leonard Hill, Chairman of the Medical Research Council of England, and one of the foremost authorities on the subject. Ultra-violet light promises to become of great importance, though its effect needs much further study.

The question of the applicability of such light in the poultry industry has been discussed with Mr. F. C. Elford, Dominion Poultry Husband-

man, Mr. George Robertson, Chief Assistant, and Dr. Weaver, Pathologist. Mr. Elford has taken the matter up with Mr. E. S. Archibald, Director of Experimental Farms. They all feel that experiments should be undertaken here to determine the influence of ultra-violet light (a) on the laying ability of hens, (b) on the fertility of eggs produced by radiated hens, (c) on eggs during the process of incubation, (d) on the rate of growth of chickens. Other points for investigation will probably be considered later.

Unfortunately the funds for the purchase of the necessary apparatus are not available in the Poultry Division. That being the case I have promised to suggest to you the appropriation of about $150 from the Research Council funds for the purchase of a quartz lamp and accessories. Would you like to have this question brought formally before the Committee on Assisted Researches or do you prefer to bring it up yourself at the next meeting of the Council? The Poultry Division staff would like to proceed with the work as soon as possible.

TO F. E. LATHE FROM H. M. TORY, EDMONTON, 17 AUG. 1925

. . . I think the Research Council would be quite willing to buy a quartz lamp and accessories, the only point would be whether it might be used in a more useful research than in connection with poultry as very few poultry raisers would be in a position to use an electric power in connection with their breeding projects. . . .

TO H. M. TORY FROM F. E. LATHE, OTTAWA, 21 AUG. 1925

I am glad to see by your letter of the 17th inst. that you are favorable to the purchase of apparatus for the purpose of carrying out experiments with ultra-violet light. I shall report to the Poultry Division that the question will be taken up on your return to Ottawa.

There probably are, as you suggest, greater opportunities for useful research with ultra-violet light than those of the poultry industry. The idea was suggested to me by remarks of Prof. Leonard Hill's. As for your objection that electric power would not be available to many poultry raisers, that is particularly true of those operating on a small scale. The objection will probably have less force as the years go by. Also it is worth noticing that this is not simply a question of electric light, but rather of ultra-violet light. Experiments may indicate that glass in poultry houses should be replaced by a substitute transparent to the

ultra-violet rays of the sun. Several substitutes are already on the market. . . .

TO H. M. TORY FROM F. E. LATHE, OTTAWA, 23 SEPT. 1925

As soon as Dr. Camsell returned to Ottawa I had an interview with him and Mr. Frechette.* Dr. Camsell emphasized to both of us his wish that the research which we are jointly undertaking should prove to be an example of hearty cooperation between different Departments of the Government, and I think that Mr. Frechette and I both appreciate the importance of this. I know that it is also in accord with your own wishes in the matter. . . .

TO J. H. GRISDALE FROM H. M. TORY, EDMONTON, 30 OCT. 1925

. . . On my way home, I saw a note in the paper that Bailey had resigned and the question was one of salary. I hope you will not mind my writing you this letter but I think it would be a tremendous pity to have a man like Bailey resign for the sake of $150 a year. We are organizing for the solution of a problem which is now costing Canada a great many million dollars annually and it seems to me foolish to stick on a small amount and get a whole staff dissatisfied as a consequence. I suggested to you once before that we might bonus Bailey somewhat and let him be related to the work being done in the University but I think you objected to that. I just wanted you to know that if there is anything we can do through the Research Council to clear this situation up, I would be glad to strive to have this done. The truth is we cannot expect to hold first class research men on the salaries we are now paying and some means must be found, if we are to really undertake great problems, to pay the best men better salaries than we are now doing. Please do not think that I am interfering at all. I am writing you personally because I think we understand each other.

RELATIONS WITH UNIVERSITIES

TO H. M. TORY FROM W. C. MURRAY, SASKATOON, 30 JAN. 1925

Professor Buller, of the University of Manitoba, has just published a third volume of his work on Fungi. A fourth volume is in course of

*Mr. Frechette was head of the Department of Ceramics and Road Materials, Mines Branch.—M.W.T.

preparation. It will contain about 600 pages, and the estimated cost of publishing it is over £700.

The Research Council made a grant towards the publication of the second volume of this work. At that time it was expected that the work could be compressed into three volumes. Buller, however, has got on the track of some very valuable matter and found it necessary to issue the fourth volume. The third volume contains some very important work on the wheat rust, and I believe he is on the verge of a very important discovery; a discovery which may throw considerable light upon the origin and instability of the strains of wheat stem rust. . . .

Thompson was greatly impressed by the probable discovery by Buller of four sexes instead of two. He thinks that it would be of the greatest importance and will give him a very high place among Botanists when he has completed his investigations.

TO W. C. MURRAY FROM H. M. TORY, EDMONTON, 3 FEB. 1925

With regard to Buller I certainly would favor making a gift but we shall have opposition to it in Ottawa from one source. Charles Murphy, the Postmaster General was raving to me about the last $1,000 given because he had no understanding what it was about. It seems that he saw in a British paper gratitude expressed for the help of the Research Council and immediately jumped to the conclusion that help was being given to some English person.

With regard to the Royal Society's request I am not personally in favour of tying up the University to anything in the way of permanent assistance to the Royal Society of Canada and in this I am sure I am in agreement with most of the younger scientific men of the country.

I have been hoping that we could get far enough forward with the research organization in Canada that a nucleus of publication work could be begun. We shall never get recognition scientifically until we have some scientific journals of our own. . . .

TO J. C. MCLENNAN FROM H. M. TORY, EDMONTON, 25 NOV. 1925

I have your letter of November 14th [re the Physics and Engineering Physics Committee]. In reply, permit me to say that I fear you have not quite understood what I was aiming at. In the first place, I do not think we should encourage individuals in the idea that all they have to do is to ask for help from the Research Council and they will get it. The

question of granting help would have to be based on a careful consideration by the Council itself of the value of the possible researches submitted and of the comparative value of the individual research in relation to others. We are working at the matter here in the University of Alberta.

In speaking to our group here I have stated that probably not one third of the subjects submitted from here would be regarded as suitable from the point of view of the Research Council and that grants even then would depend on the men and the possession by the university of the fundamental laboratory equipment necessary. What I am anxious about is that we should definitely set down a list of problems in Physics and Engineering Physics which we consider as worth having undertaken in Canada. Preferably these problems should be those the solution of which might ultimately be helpful in an economic way. I do not think that this should interfere in any way with work being carried on in universities. The university men have their research problems growing out of their past experiences in work and these should be carried on by themselves. If they fear to submit the names of these, lest someone should rob them, let them refrain from mentioning work now going on. I would not consent, personally, for a minute to the Research Council giving money nor to helping researches which the universities themselves should rightfully be carrying on. It should be understood from the beginning that the Research Council will only help in a case where the problem is important and where the university itself is doing its share. I think we should aim to get our scientific men to think somewhat as a unit, seeing the problems before us as a unit. The question of how and who are to solve them is another matter altogether. We shall have done something definite to arouse interest in physical research, if we do nothing more than call attention to the outstanding problems on which we should like to see work done. I do not think the first step is even in hinting at help to be granted but rather to get our own minds clear with relation to investigations which we believe should be undertaken. . . .

TO H. M. TORY FROM W. J. BROWN,* LONDON, ONT., 26 NOV. 1925

Will you please inform me what steps I should take to procure for the University of Western Ontario representation on the National Research Council of Canada. The members of the University staff feel that they should have a part in the movement in behalf of industrial and

*Executive Secretary, University of Western Ontario.

agricultural research which the Council is endeavouring to promote. The University is doing some excellent work in certain directions at the present time and hopes to continue to grow.

It seems to us that the most effective way to carry on research work at present is to ask all the colleges and universities to cooperate and place as far as practicable their scientifically trained men and their laboratory equipment at the disposal of the Council. This is the attitude of mind of the staff of this institution and we should like as far as lies in our power to render effective service.

We believe that we would be better informed and could cooperate much more readily if we had representation on the Council. . . .

TO W. J. BROWN FROM H. M. TORY, EDMONTON, 1 DEC. 1925

I have your letter of November 26th. With regard to the representation of Western Ontario University on the National Research Council of Canada, I beg to say that at the moment there are no vacancies on the Research Council. The law requires that there be fifteen members representative of science and industry and all of these were appointed a year ago. Permit me to say, however, that it would be impossible to give representation to all the universities of Canada on a council of fifteen members and at the same time have any place at all for men representing industry. There are on the Council men from McGill, Toronto, Queen's, Dalhousie, Alberta and Saskatchewan Universities, but these men were not selected because they represented universities but because they were on the whole outstanding men in either administratitve or scientific work. There are no persons on from the following universities: British Columbia, Manitoba, Western, Ottawa, Laval, New Brunswick, Acadia or Mount Allison. You can see that if we were to admit the claim of all universities to representation, we should be in very deep water indeed. When the date of reappointment comes, the question of a more equitable distribution of representation will be considered. In the meantime, Mr. Hume Cronyn, one of your good friends, is on the Council.

What we really do desire, however, is to have all the universities represented on the associated committees of the Research Council, the bodies which give advice and guidance to the Council in its work. There are a considerable number of these. If you will look up the last annual report, you will see who are the representatives on these committees. I would suggest that here is the place you might very well ask for representation at once, if the membership of your university is not represented.

TO THE HON. JAMES A. ROBB FROM W. J. BROWN, LONDON, ONT., 9 DEC. 1925

Possibly you will remember that I was introduced to you on the 2nd instant. . . . I made two suggestions which, with your permission, I should like to recall to your mind.

1. The National Research Council of Canada have large plans in mind for the development of agricultural and industrial research. The Conference at Winnipeg was greatly impressed with Dr. Tory's presentation of this subject, but afterwards in conversation with Dr. Tory, he agreed with me that the businessmen of the country are not prepared, for the time being, to ask the Government of Canada to undertake a large expenditure for the purpose of promoting research work. We do not believe that under the circumstances the Government would be justified in putting up a large plant and engaging a permanent staff of highly trained research experts. On the other hand, it is necessary for the work to be done. The whole country today is suffering because we are not utilizing our brain power and we are not developing our resources as we should.

I suggested to you that instead of putting up a large plant immediately and engaging a staff for this particular line of work, that the universities and colleges of the country might be called upon to cooperate with the National Research Council and place, as far as practicable, their laboratory equipment and their trained personnel at the disposal of the Council in order to carry out an aggressive program of research work. Such a plan would help everyone in Canada; would enable scores of young men to acquire training in research work and would accomplish very largely the purpose we have in view. It would not be long before public opinion in Canada would be solidly behind research work. In four or five years from now the country ought to be in a much more prosperous condition; then it would be possible to go ahead with the ambitious scheme that is now proposed by the National Research Council. The Dominion Government could cooperate in this undertaking with very good effect. No doubt the Provincial Governments would also help. The work being instituted on a much more modest scale would cost only a fraction of what is proposed to expend but would prove its value very quickly.

In support of the foregoing proposal, I may say that this University is at the present time conducting research work in an effort to stay the ravages of the corn borer. We are being assisted by the National Research Council and we are utilizing the facilities we have at hand. This University is particularly favourably situated for research work in agriculture.

I have discussed our possibilities in this direction with the Deputy Minister of Agriculture and he is quite in accord with our view. We are in the centre of a very fine agricultural district and we have climatic conditions here that cannot be duplicated elsewhere in the Dominion. Assistance from the National Research Council or from the Dominion Government would be of the greatest possible help to us directly and to the constituency we serve. We should like to establish in connection with this University an Agricultural Research Institute, through which we could grapple with the major perplexing problems that now confront agriculture in this Province. If we could help to solve some of these problems, our work would benefit the whole Dominion. Two of our professors in biology have been working on Dominion Government investigations. All our scientific men are anxious to cooperate in similar undertakings. Therefore, I feel that should the National Research Council consider allotting problems to various institutions the whole staff of this University would rise to the occasion and the members would do their best to give the kind of service demanded. . . .

TO THE HON. JAMES A. ROBB FROM H. M. TORY, EDMONTON,
18 DEC. 1925

I enclose, herewith, the letter from Mr. Brown which you gave me to read. I think, perhaps, in returning it, I had better make one or two remarks about it.

First, whether wilfully or not, Mr. Brown has completely misinterpreted the conversation which took place between him and me. I gave to the Conference at Winnipeg the best presentation that I could of what I deemed to be the urgent necessity for quickening our work in research, pointing out where Canada stands in comparison with other countries and the danger industrially for us to become dependent on other people. My address was an honest presentation of the subject. No conversation have I ever had with anybody that could for one moment bear the interpretation that my public presentation of the theme and my private views were not in accord with each other. I did not agree with the statement Mr. Brown made to me at all. I said I knew there would be difficulties in accomplishing a large scheme at the moment, but that I believed if Canadian businessmen knew the significance of it, they would force the problem upon our hands. The fact that the resolution which passed the Conference was agreed to unanimously is a vindication of my judgment in the matter.

Secondly, I have never personally had in mind the engaging of a large body of experts. A few men acting in an advisory capacity to research workers generally and with laboratories open to the industries, to which they could send their men for work, such as the Mellon Institute, has been my idea all along. I am convinced that this is a stern necessity for us in the near future.

With respect to the second suggestion that we should call into active cooperation the universities of Canada, Mr. Brown evidently does not know that we have been cooperating to the fullest extent with the universities, doing our very utmost to stimulate research in the university laboratories. Each year we have at least forty men with scholarships working in the university laboratories. It is true that not many men from the University of Western Ontario have been doing research work, for the reason that their laboratories have not been equipped to carry on work of an advanced character, excepting in special departments. Our "Who's Who" shows that we have to date trained 130 men, most of whom are now either working in universities or employed in Canadian industries. The very moment that the University of Western Ontario can submit to us proposals for carrying on research and show that they have laboratory accommodation for doing it, they will certainly receive our sympathy and cooperation.

As to the whole staff of a university rising to the occasion, I have only to say this—that in the 35 years that I have been associated with university life and in which I have been actively engaged in promoting research, I have not found it possible to have the university laboratories do work very far removed from the work associated with their teaching activities. Furthermore, I have not found it possible to use men devoting most of their time to undergraduate teaching. Only a few of the universities are giving teaching courses suited to the training of men for higher research. When one has to deal with a large industrial problem, there are no universities in Canada with spare laboratory space available in which to conduct such researches. I do not know a single university today that could undertake a large piece of industrial research without beginning by building laboratories and putting in equipment to do it; and even after that is done, the time of the best men is absorbed either in teaching work or in handling their own problems. It is very seldom that the pure scientist is willing to put aside his own work and undertake a special piece of industrial work. The man willing to do so is usually one who is not progressive enough to have problems of his own already on hand and generally does not succeed in doing work after it is given to him. . . .

P.S. If, instead of building a Central Research Laboratory, the National Research Council undertook to build a special Research Institute at any university, the Council would be deluged with similar claims from those which are so small as not to have equipped laboratories of their own.

RELATIONS WITH INDUSTRY

TO H. M. TORY FROM A. BURTON (MIDDLESEX MILLS), LONDON, ONT., 15 JAN. 1925

Referring to our conversation re research, we feel strongly that the lines to proceed along are a general research into and survey of the wools produced here, with a view to their suitability to Canadian mill requirements and manufacture in this country. . . .

Further, owing to the fact that the textile industry has suffered from financial stringency and bad trade, the woolen mills of this country are naturally in an unfavourable condition for the development of research, entailing a large outlay within the industry and must look to the Research Council to come to their aid in order that the industry may grow and prosper and develop along right lines that will link it up with our natural resources and bring prosperity to our country. . . .

TO H. M. TORY FROM C. J. MACKENZIE,* SASKATOON, 11 AUG. 1925

I am writing in connection with the research into "the disintegration of concrete in alkali waters" which is being conducted under the auspices of a Committee of the Engineering Institute of Canada, and which has been supported financially through the kindness of your Council and of the Canada Cement Co., Canadian Pacific Railway, City of Winnipeg and Prairie Provinces.

We believe that a very real and valuable work has been done and that already the results obtained both of a scientific and practical nature are well worth the money spent. . . . Dr. Thorvaldson, the director, is giving his services absolutely gratis and the salaries of his assistants are kept on the regular University of Saskatchewan scale for assistants and instructors of equal qualifications. The Province of Saskatchewan, through the University, has given free all laboratory accommodation and

*Chairman, Committee on the Deterioration of Concrete in Alkali Soils.

much equipment (and besides has made a money grant of $9000 to date) so that all expenditures we feel justified in claiming are being made well and profitably.

We have at present in the bank sufficient funds to permit us to operate another month or so, and we are asking you and our other financial supporters to continue for one year at least the yearly grant which you so generously made for three years. The amount of your grant was $5000 a year.

I am enclosing a brief review of the first papers published together with a reprint of the papers, which will, I hope, give you some idea of the work that has been done, the value of that work, and the real advantage of continuing the work which is going on so well now and from which we may confidently hope for much in the next years. It is only natural that every dollar spent during the next year will yield a far higher return than during the organization period and we feel strongly that it would be unwise to allow this research to drop now just when we are about to enter the really productive phase. . . .

1926

"Usefulness in science is a bonus which is paid as a reward for understanding."—M. R. Hopkins

"To be always seeking after the useful
does not become free and exalted souls."—Aristotle

THE POLITICAL SITUATION in 1926 was vigorously productive of changes in key figures, and the National Research Council was confronted with no fewer than four Ministers of Trade and Commerce. The Hon. J. A. Robb occupied this post for the first six months. Then the Conservatives supplied H. H. Stevens for a few weeks, followed by the Hon. J. D. Chaplin; and in October the Liberals installed the Hon. James Malcolm.

The Deputy Minister, however, continued to be the same man as in 1917; O'Hara continued in his attempts at obfuscation, and Eagleson continued to thwart him*—to the great interest of Tory,* who applauded softly lest anyone should notice.* Eagleson was now an O'Hara-thwarter of some years' standing.

Tory had a life-long, almost-mystical respect for *any* elected representative of the people, regardless of party, and whether federal or provincial. However, he was influenced to some extent by his mother, who believed that no one who was not a Liberal could hope to enter the Kingdom of Heaven (1). When the Liberals were in, Tory had a tendency to feel that "the government is back in office."*

The Hon. J. A. Robb proved to be unexpectedly tough with the

*Document quoted in this volume.

Council, ordering them out of their three rooms in the West Block and, at the same time, refusing a small laboratory for the work on magnesite (2). This did not accord with his obvious interest in work that he had himself suggested; later it became apparent that he was opposed to any new laboratory in Ottawa but was quite agreeable to refitting some parts of an older building as laboratory space (3).

The magnesite research was being done in the laboratories of the Mines Branch through the kindness and goodwill of Dr. Camsell, but obviously this imposition could not be prolonged indefinitely (4). Late in 1926, the Hon. James Malcolm agreed to the earlier plan of using the top two floors of the Bryson Building at 178 Queen Street, the upper floor as a laboratory and the lower as office space. Eagleson makes the wry comment that this was done to make room for the Tariff Board in the West Block rather than from any consideration of the needs of research.* The NRC moved to the Bryson Building at the end of the year, happy even in this tiny space with its hands on actual work. Most of the supplies and equipment were second-hand, thanks to an astute bargain made by Frank Lathe.*

When H. H. Stevens became Acting Minister of Trade and Commerce, Tory told Eagleson that Stevens could be friendly to the Council but, on the following day, added the caution "unless being in a position of authority changes his mind."* Tory possessed and wielded a powerful insight into his fellow humans; in this instance it had the effect of a prophecy, which came to pass in the early thirties.

Stevens and Chaplin both avoided any action that could possibly be deferred, because of the uncertainty of the political situation.*

Dr. Tory mentions once more his notion of a Canadian department of government that would formally include science, but it now emerges that he regards this primarily as a device to obtain laboratories of which he would be master.*

This year brought an example of an interesting problem. How does one go about handling scientists whose demands are unorthodox, the outcome of whose work is unknown and probably inclined to be negative, and who are elderly, stubborn, and highly distinguished? Administrative virtue calls for a tough attitude; but all

the emotional history cries out that this man must not be hurt. Respect for the talented teacher whose wisdom was there when it was needed, respect for distinguished achievements, indulgence felt towards a grand old man—all the emotional factors line up on the side of tender treatment.

Howard T. Barnes was an F.R.S. who now called himself a research ice expert: he wanted to blow up icebergs with thermite. But he wanted a free hand to operate on his own, without the advice (or control) of a suggested committee, and he refused to sign papers of application for a grant. He felt that so distinguished a man as he was should merely be given the money and left alone.* And he tended to believe that in fact such a promise had been made to him.*

Administrative virtue triumphed and, however regrettably, the distinguished gentleman had to have his feelings hurt. It is interesting that the feelings were bruised not so much because of caution towards the outcome of his work as by the indignity of having to sign various bits of paper. Apparently, as he aged, he found this gesture increasingly repugnant, as a symbol of subservience which did not accord with his self-image. Such attitudes seem to attack certain professors after half a century of being looked up to and admired.

A letter from R. J. Manion, suggesting that NRC take up the study of iron ore,* drew a swift reply from Eagleson,* who was incensed because this problem had been studied by NRC for some years and the resulting reports had been placed on the desks of members of parliament each year since 1918. Throughout the Council's history, persons of some authority have pointed out that the work of the Council is practically unknown; in 1926, this was said by O'Hara (5), R. B. Bennett (6), and Sir George Foster (7). The assumption is that this can be remedied merely by supplying information; but in fact the supply of information has always been ample and, indeed, relentless. Eagleson and his successors saw to that. On this occasion, Eagleson could hardly be blamed for pointing out that it was attention that was lacking, not information. Very few people at this time were set to pay attention to science and, as it happened, Postmaster General Manion was not among their number.

REFERENCES

1. Verbal, S. P. Eagleson to M. W. Thistle, Nov. 1956.
2. Telegrams, S. P. Eagleson to H. M. Tory, April 19 and May 15, 1926. NRC Papers, National Science Library.
3. Letter, F. E. Lathe to H. M. Tory, Sept. 15, 1926. NRC Papers, National Science Library.
4. Letter, F. E. Lathe to H. M. Tory, April 30, 1926. NRC Papers, National Science Library.
5. Letter, F. C. T. O'Hara to S. P. Eagleson, May 6, 1926. NRC Papers, National Science Library.
6. Letter, R. B. Bennett to H. M. Tory, June 8, 1926. NRC Papers, National Science Library.
7. Letter, Sir George Foster to H. M. Tory, April 12, 1926. NRC Papers, National Science Library.

DOCUMENTS

INTERNAL RELATIONS

TO H. M. TORY FROM A. NORMAN SHAW (DEPARTMENT OF PHYSICS, MCGILL UNIVERSITY), MONTREAL, 21 APRIL 1926

. . . I feel that it is very important that the extra energies of those who have voluntarily offered to help along schemes for promoting research should not be diverted into channels of unproductive discussion or bickering; but at the present moment many members of our local self-appointed Quebec committees (including over fifty members) are seriously annoyed by the report of the Main Associate Committee on Physics and Engineering Physics as laid before the Research Council, so much so that I would strongly recommend that some brief acknowledgment of an intention to study the matter in the Quebec local report should be made by the Research Council or by you in the meantime. . . .

TO A. NORMAN SHAW FROM H. M. TORY, EDMONTON, 4 MAY 1926

I have your letter of April 21st. . . .

Now, with regard to the matter concerning which you wrote me—the facts, as I see them, are these:

1st. When I met the Research Council in May last and gave the "harangue" on the subject, I was exceedingly desirous to stir up a keener interest in the problems of physics and engineering physics and in making clear to the committee the attitude of the Research Council with regard to the committee's functions. From the interest that followed it would appear that I was eminently successful in doing what I had started out to do.

2nd. I do not desire the Physics and Engineering Physics Committee to go outside the range of problems that would properly belong to Physics and Engineering Physics and was surprised when I found that McLennan was securing statements concerning all researches on problems, many of them belonging to other committees which I was trying to stimulate to work in a similar manner.

3rd. The result of the effort was that a great list of problems were submitted that needed classification and a great deal of time to get a proper appreciation of their value. . . . it became perfectly clear to me that McLennan's view of dealing with these in half a day at Montreal would get one nowhere. . . .

4th. . . . No matter therefore what the report may be when the Committee meets on the 21st, the matter will be taken up fully by the Research Council itself at its next meeting. . . . I would suggest that you and others of the committee should approach the whole matter in a non-contentious spirit. Insist upon having any recommendations you submit voted upon. McLennan, the chairman, has not authority (I say this of course to you personally) to make a report other than the report which the committee sanctions.

5th. I do not think the Quebec group have any reason to worry over your report being pigeon-holed in the files of the Associate Committee. All matters which come before the Associate Committee have eventually to reach the general committee and I give you my personal assurance that the whole report will be fully and carefully considered . . . let me state also that in a matter of such weight you should not expect to get a final judgment on things in a hurry. These things take time and it may be the autumn before we can reach finally a formal conclusion about some of the problems as most of the committee are men with other matters on their hands and I am personally tied up fairly tight until holiday time. If you will just have confidence in the attitude of mind of the Research Council and in my own good-will to see things treated fairly I think you will be satisfied that in the end full and careful consideration was given to the matter and sincere judgment resulted. . . .

MEMORANDUM BY H. M. TORY, OTTAWA, 21 JUNE 1926

Problems Suggested to the Associate Committee on Physics and Engineering Physics

At the annual meeting of the Associate Committee on Physics and Engineering Physics, held in May, 1925, Dr. Tory asked the Committee to assist the work of the National Research Council by securing a list of problems on physics and engineering physics, and by making recommendations to the Council of such problems as appeared worthy of their support.

In order to better comply with this request a number of provincial committees were formed. These in turn were assisted by numerous sub-committees which were especially fitted to deal with problems of specific industries. As a result of the action of these committees and sub-committees some four hundred and fifty problems were submitted. . . .

The National Research Council met on June 7th to 9th, 1926, and gave careful consideration to the recommendations of the Associate Committee on Physics and Engineering Physics. It was found on examination that research on a number of the problems recommended was already under way by the Council. Applications for assisted researches on eight others were received from the Committee on Assisted Researches and approved by the Council. The scholarships granted at this and the previous meeting of the Council, while awarded strictly according to the merits of the applicants, were nevertheless found to assist in a solution of other problems through the provision of research workers. . . . Where it appeared that special problems would best be handled by other organizations, such as the Fuel Board, the Connaught Laboratories and the Geological Survey, it was decided to refer such problems to them for action.

The President and members of the National Research Council wish to place on record their appreciation of the excellent service which has been rendered by all the individuals and committees which have co-operated in this work. As a direct result of their action a considerable amount of research has already been arranged for and further aid will be extended as fast as the limited means of the Council permit. The list of problems collected will until solved remain a challenge to the ingenuity and industry of the research workers of Canada.

RELATIONS WITH THE DEPARTMENT OF TRADE AND COMMERCE

TO F. C. T. O'HARA FROM S. P. EAGLESON, OTTAWA, 5 MAY 1926

. . . regarding the publication of the Annual Report of the National Research Council together with the Annual Report of the Department of Trade and Commerce, I thoroughly agree that the increased publicity for the work which is being carried on by the Research Council would be of considerable value to the Council and after his talk with you, Dr. Tory discussed with me your suggestion that the Annual Report of the Department of Trade and Commerce and of the Research Council should be published jointly.

Perhaps I should say, however, that Dr. Tory certainly was not under the impression that any final decision in the matter had been reached when he discussed the matter with you, but, rather, that if he found that it would be possible to accept the suggestion, which obviously has considerable merit from our point of view, he would take the matter up with you further. On looking into the matter, however, he was of the opinion that it would be impossible to accept your proposal and comply with the requirements of the Research Council Act, which specifically defines the procedure to be followed by the Council in presenting and printing its Annual Report and so far as I am aware this is how the question stands in his mind at the present time.

I might also perhaps explain that in addition to the above there are other problems in connection with your suggestion which it would be extremely difficult for us to overcome. In view of the fact that practically all our research work is carried out in university and other laboratories under the direction of persons who give their services entirely without remuneration, it would be no easy matter for us to secure reports from each individual and Committee working under our auspices on such a basis as promptly after the close of the fiscal year as would be the case if we were dealing with employees. The difficulty in this connection is further accentuated by the fact that the Government fiscal year closes at the busiest time in the year for members of university staffs who are then in the midst of examinations and other duties incident to the closing of the academic year. Some reasonable latitude must therefore be allowed under such circumstances. . . .

. . . the net result is that it is not possible for the Research Council to issue its Annual Report at as early a date as can a Government Department which is dealing only with employees whose entire services are under its direction.

Even if these difficulties did not exist, however, I may say that in view of the volume of work now on hand and the meetings which are to be held during the next six weeks, all of which demand a considerable amount of attention, it would be physically impossible for me to guarantee to complete our Annual Report by June 15th next with the staff at present at my disposal. . . .

TO S. P. EAGLESON FROM F. C. T. O'HARA, OTTAWA, 6 MAY 1926

I have your letter of May 5th. Of course if the suggestion cannot be carried out, that settles it. The only thought lying behind my suggestion was that the man in the street knows little or nothing of the valuable work being done by the National Research Council, and I have heard people say, why spend all this money when nothing comes of it. I, of course, know from my casual dealings with the estimates, the work the Research Council is doing, and as I suggested to Dr. Tory, if the National Research Council did not publish its own report telling the public what it was doing, it might tack it on to mine, thereby reaching the very people who are interested in national research work from the commercial standpoint. However, the matter may remain to be worked out in any way Dr. Tory desires.

TO H. M. TORY FROM THE HON. R. B. BENNETT, OTTAWA, 8 JUNE 1926

On my return to the city I received your synopsis of the activities of the National Research Council, for which I very sincerely thank you. I propose reading it with care.

I do not know why, but for some reason I feel that industry in this country has not availed itself to the extent it should of the knowledge that has been acquired in our Universities and elsewhere through the research efforts of our citizens. I should like to discuss the matter with you at some convenient time.

TO THE HON. R. B. BENNETT FROM H. M. TORY, EDMONTON, 22 JUNE 1926

. . . I will be grateful indeed, after the session is over and you have returned to Alberta, for an opportunity to discuss with you the whole question of the relation of research to industry. You are quite right in your supposition that our industrial men are not yet alive to the significance and meaning of research.

MEMORANDUM BY H. M. TORY REGARDING THE NECESSITY FOR AND VALUE OF SCIENTIFIC RESEARCH

. . . Recently, the Research Council listed a set of problems awaiting solution in Canada and they filled approximately seventy typewritten pages.

IV. *A Policy*

What is required is a real national policy with respect to research. I made bold at the Winnipeg Conference to suggest that the name science should be attached to a department of the government, suggesting for example, that the Department of Trade and Commerce might very well become a Department of Science, Industry and Commerce, and in co-operation with the government I would invite the scientific technicians of the great industries of Canada and would provide the laboratory accommodation necessary for carrying on their researches. I am confident that with proper organization and at a very reasonable cost, if laboratory facilities were placed at our disposal, we could do more to render Canadian industry stable and profitable than through any other single agency. It is respectfully suggested that here is a counter policy which at small cost could do a great deal to remove the tariff agitation. If the government could see its way clear to make the question of research for agriculture and industry a matter of fundamental policy, they could without question change the outlook upon industrial problems in a moderate amount of time. I think it is useless to say that this should be done by the industries themselves. It is a matter of national importance. After all, research like all other constructive work, requires the backing of those who know and think in the terms of national prosperity. I have expressed the judgment on various occasions that in the life time of one generation we could add through research to the value of our national resources the equivalent of our national debt and I am confident that that statement could be justified. It is estimated that Marquis wheat alone has already benefited Canada to the extent of five hundred million dollars.

I am further confident, viewing the scientific competition now going on in the world that unless we put deliberately and definitely scientific effort behind our industrial and agricultural development we will lose the place of superiority which our natural resources give us.

TO S. P. EAGLESON FROM H. M. TORY, EDMONTON, 7 JULY 1926

. . . I would also have a careful memorandum prepared, making it as

short as possible, which you can leave in his hands, and also give him the copies of the draft Orders-in-Council which were in the hands of the previous Minister. I think you will find Mr. Stevens exceedingly friendly over the whole matter unless being in a position of authority changes his mind.

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 21 JULY 1926

Since the Honourable Mr. Chaplin has assumed the duties of Minister of Trade and Commerce he has been extremely busy as he is also Acting Minister of the Department of Customs during Mr. Stevens illness, and, I understand that he will continue to so act until after the election. . . .

During our discussion as to the other requirements of the Council he pointed out that owing to the uncertainty of the political situation at the present time, it was not his intention to take any action whatever, unless it was absolutely necessary to do so, prior to the election. He thought that all questions which could possibly be allowed to stand should be deferred for the present. . . .

TO THE HON. JAMES MALCOLM FROM S. P. EAGLESON, OTTAWA, 29 SEPT. 1926

As you are probably aware, Dr. H. M. Tory, the President of the National Research Council, is at present en route to Tokyo, Japan, as the official representative of the Government of Canada to the Third Pan Pacific Science Congress, which is being held in Japan at the end of the present month and during the early part of November. I am therefore directed by Dr. Tory to submit to you, in his absence, a concise statement indicating certain pressing questions relating to the work of the National Research Council, which it is essential should be brought to your attention for consideration and such action as may be deemed advisable.

Estimates, 1926–27

A vote of $150,000 was provided in the estimates for the current fiscal year for the work of the National Research Council. This vote was passed by the House of Commons, but supply bills covering only one-quarter of the above amount were passed before the dissolution of Parliament. Since that time one-twelfth of the total estimate has been provided for the work of the Council, each month, by Governor General's warrants. It is essential that the entire balance of this vote should be provided during the current fiscal year and that not less than one-

twelfth of the total estimates should be provided each month by Governor General's warrant, pending the re-voting of this item when Parliament meets.

In illustration of this necessity, the following facts may be mentioned:—

(a) At the present time there are more than fifty scientific investigations in progress under the auspices of the Council in various laboratories throughout Canada. Each of these investigations is carried on under the direction of a highly qualified scientist who, without remuneration for his services, co-operates with the Council in the supervision and prosecution of this work. Further, some of these investigations represent co-ordinated work by a number of investigators and by several laboratories. Many of these investigations involve several years' work, and if interrupted for even one year the whole programme would be seriously endangered.

(b) For the past nine years the National Research Council has awarded each spring a number of scholarships. . . . The purpose of these awards is to develop in Canada a corps of thoroughly qualified research workers competant to solve the scientific problems of Canadian industry and agriculture. Fifty persons have been awarded such scholarships for the academic year 1926–27.

These grantees have accepted the scholarships awarded to them and have now lost any opportunity which they may have had to continue in post-graduate work under any other auspices, as vacancies on the university staffs are now filled for the coming year. These awards were granted in good faith and accepted in good faith and it is consequently essential that this obligation be met by the Council.

(c) During the past nine years, the Council has succeeded in building up a research organization which now numbers 389 persons, of which number 314 persons serve without remuneration of any kind. . . . Any serious interruption of the work which is now in progress would undoubtedly result in the Council losing the co-operation and assistance of many of these individuals who voluntarily serve the Council at considerable personal sacrifice.

Office and Laboratory Accommodation

The space occupied by the National Research Council in the West Block is entirely inadequate to meet its requirements and just before the resignation of the Liberal Government early last summer, arrangements had been completed with the approval of the Hon. Mr. Robb, Acting Chairman of the Committee of the Privy Council on Research, and the Hon. Dr. King, Minister of Public Works, for the Council to occupy office and laboratory space in the Bryson Building on Queen Street and a recommendation to Council authorizing the rental of the

required space was before Council when the Government resigned. No action has as yet been taken on this recommendation. . . .

Staff

Two recommendations to Council, signed by the Hon. Mr. Robb as Acting Chairman of the Committee of the Privy Council on Research, providing for the establishment of three new positions on the staff of the Council, were before the Privy Council when the Liberal Government resigned office early last summer. . . . All of these positions are essential in order to efficiently carry on the administrative work of the National Research Council, and as considerable delay has already ensued, action should be taken to provide the Council with this assistance as soon as may be possible.

Statutory Salary Increases

The Department of Justice has ruled that appointments to the staff of the National Research Council must be made under the provisions of the Research Council Act and not by the Civil Service Commission. . . .

For the single purpose of meeting the technical requirements of the Auditor General in this matter, a recommendation to Council was drafted and submitted to the Hon. Mr. Chaplin early in the present month. I am informed that this recommendation was approved by Mr. Chaplin and forwarded to the Treasury Board for consideration, but that action has not as yet been taken thereon. . . .

Superannuation

The Department of Justice has ruled. . . .

In plain language, these rulings merely mean that, provided an Order in Council is passed designating the staff of the National Research Council part of the Civil Service for the purpose of the Superannuation Act 1924, there can be no question as to the legal right of any member of the permanent staff of the Council to contribute to and benefit under the provisions of the Civil Service Superannuation Act 1924. . . .

. . . a number of these employees occupied permanent postions in other departments prior to their transfer to the staff of the National Research Council and consequently have considerable service to their credit. It would be manifestly unfair to these employees to debar them and their families from the benefits of Superannuation. . . .

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 28 OCT. 1926

Immediately on receipt of the instructions contained in your letter of September 25th last, I prepared a letter to our new Minister, Hon.

James Malcolm, outlining the questions relating to the work of the National Research Council which required his consideration and action. . . .

Let me say frankly that I do not think that the present Minister is antagonistic toward the work of the Council. At least, I did not gather that impression from the short discussion which Dr. Camsell and I had with him yesterday morning. He informed us that he has been quietly reading documents relating to the work which the Council has been carrying on and was astounded that an organization which was doing such an extremely important piece of work should be so entirely unknown, especially to the industries of the Dominion. He also expressed the opinion that greater emphasis should be placed on industrial research. I promptly assured him that this was also the opinion of the Council and called his attention to the fact that the Council has been urging almost since its inception that reasonable facilities should be provided which would make it possible for them to engage in industrial research. I also pointed out to him that under the conditions which have obtained up to the present time, it was necessary for the Council to use existing facilities, both men and laboratories, and that as there are no large industrial research laboratories in Canada at the present time, it is to be expected that the investigations carried on by the Council under such conditions would of necessity relate to scientific research, rather than to industrial research. So far as I can judge, from our interview, I firmly believe that when you have had an opportunity to discuss the work of the Council with Mr. Malcolm, many of our difficulties will be over, for, so far as I can judge, his opinion as to the direction which the work of the Council should take is in exact agreement with your own. I feel, however, that such an interview should be held at the earliest possible moment.

As I have indicated, I do not believe that the Minister is antagonistic toward our work, but I do believe that he has been badly advised. I am strongly of the opinion that Mr. O'Hara has not been playing fair with us and while he may not be going out of his way to place obstacles in our path, he is not losing any opportunity of throwing sand into our machinery, which may present itself to him either in big or small matters. I am satisfied that we are receiving no assistance in any way from Mr. O'Hara and I strongly suspect that he is responsible for more than a few of our present difficulties. Consequently, it will be necessary when you see the Minister to impress upon him that in so far as questions relating to the work of the Research Council are concerned, he should look to the officers of the Council for advice and not to the Deputy Minister of Trade and Commerce. . . .

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 27 NOV. 1926

. . . I learn that the idea had in some way got into the Minister's mind that Research Council reports were not being distributed in any effective manner and that they were probably being buried in public or private libraries, rather than serving any purpose such as would justify the expenditure of public money in their publication. His secretary informs me that my letters effectively dispelled this idea, so far as these two reports are concerned.

I have already written to you regarding Mr. O'Hara's action in this and other matters relating to our work. You may consequently judge for yourself the extent to which he is probably to blame for the misconception in the mind of the Minister on this question.

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 27 NOV. 1926

You will be interested to know that a definite decision has at last been reached to provide the Council with the space agreed upon last spring in the Bryson Building. I am of the opinion, however, that this action has been taken because of pressure brought by the Tariff Board for accommodation, rather than from any special realization of the necessity of providing space for the Research Council. . . .

TO S. P. EAGLESON FROM H. M. TORY, EDMONTON, 9 DEC. 1926

. . . Leave the matter of the marine borers till I come down. I propose having a show-down this time, now that the government is back in office.

TO H. M. TORY FROM F. E. LATHE, OTTAWA, 21 DEC. 1926

When we discussed plans for the laboratory in the Bryson Building you gave us authority to spend up to $5000.00 in equipping it. . . . We recently had the opportunity of buying the entire laboratory supplies and equipment of the defunct British America Nickel Corporation and there was so much of this which we could use to advantage that I made them an offer of $2325.00 for goods which cost between ten and twelve thousand. This offer was accepted and we have now moved the goods to the Bryson Building. . . .

RELATIONS WITH CONTROL AGENCIES

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 3 MAY 1926

Since you were last in Ottawa I have had some considerable difficulty with the Auditor General's office. . . .

. . . I wrote to the Justice Department and took the letter over personally to discuss the matter with the legal officer of that Department who handles questions relating to the Research Council. On explaining the question to him, he immediately agreed that the technicality raised by the Audit Office does not exist and that the Council has complete authority to exercise the powers defined in Section 10 (f) of this Act. . . .

If a satisfactory and reasonable adjustment of this matter cannot be arranged, then it would remain for consideration as to whether the Research Council Act should not be amended to provide that the expenditures of the Council shall be audited by some reliable firm of chartered accountants. . . .

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 22 JULY 1926

. . . the Minister has confirmed the appointment of the three persons on the staff previously appointed by the Civil Service Commission, in order to comply with the request of the Auditor General that all employees appointed since the coming into force of the Research Council Act be appointed in accordance with the provisions of our Act and not by the Civil Service Commission. . . .

RELATIONS WITH GOVERNMENT DEPARTMENTS

TO F. C. T. O'HARA FROM S. P. EAGLESON, OTTAWA, 22 JAN. 1926

I wish to acknowledge receipt of your letter . . . regarding Langfullite, a new substitute for gasoline, which it is claimed will give the same results as gasoline, but can be manufactured for about three cents per gallon.

. . . I do not see just what action it would be possible for the Research Council to take in the matter, as it is not the function of the Council to assist in the commercial exploitation of patented inventions. . . .

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 22 JAN. 1926

. . . The claims made for this new fuel are so "perfectly wonderful" that I cannot help thinking of the case about which Colonel Tizard told us when he was in Canada. You will probably recall that a gentleman making similar claims for a new fuel substitute which he had invented,

organized a company for the manufacture of the product and approached the Department of Scientific and Industrial Research in Great Britain to investigate their claims for the product. After some hesitation, the Department agreed to do this on certain conditions which they laid down, including the condition that the investigation would be entirely under their direction and control. It was immediately announced in the press that the Department was interesting itself in this new discovery and was going to carry out a thorough investigation under its own auspices, with the result that the stock which was being sold by the company went sky high. On several occasions definite arrangements were made and definite dates set for the proposed investigation, but on each occasion some excuse was made by the investigator to delay the test. In the meantime the publicity and the stock selling continued and finally, when forced into a corner, the inventor entirely withdrew from the agreement he had made with the Department and disappeared with the money he had gathered from his stock selling enterprise.

This may, of course, have no relation to the present discovery, but the prospects seem to be so alluring as to make one suspicious. . . .

TO H. M. TORY FROM J. S. PLASKETT (DOMINION ASTROPHYSICAL OBSERVATORY), VICTORIA, 9 MARCH 1926

. . . the assistant deputy minister of my Department, Mr. Gibson, Mr. Cory being away, was speaking to me about the relations between the Department and the Research Council, and, in confidence, he seemed inclined to view the activities of the Council as tending to encroach upon the prerogatives of the Department. . . .

He asked me, when Camsell and Grisdale were members of the Council, why Mr. Cory, the Deputy Minister with a large amount of scientific work under his control, has been left out. He said that while he believed Mr. Cory was not desirous of acting, the principal officers of the department thought he should be a member.

I thought it only right I should tell you this as I am convinced, and told Gibson so, that your object was to cooperate in every possible way and that if the contrary impression prevailed in the Interior Department, it must be a legacy from the attitude of previous Chairmen.

I have the impression that if Mr. Cory could be appointed that the present attitude, which appears to be of suspicion, might be changed to one of support and that I think would be very desirable and, with my wish to further the influence of the Council, must be my excuse for writing this letter.

TO J. S. PLASKETT FROM H. M. TORY, EDMONTON, 16 MARCH 1926

I wish to thank you for your letter of March 9th. I am glad that you felt able to speak to Mr. Gibson as you did. As a matter of fact there is nothing that I can do to bring the Department of the Interior into line that I have not done except appoint Mr. Cory to the Council. The one department of the government that has given us no cooperation of any kind is the Department of the Interior. We have done a good deal in various ways to help the Department of the Interior but they have been so deliberate in their department not to mention the Research Council in any of their publications that I cannot but think they are acting under instructions from Mr. Cory. That was the real reason why I felt it would be unwise to appoint Mr. Cory to the Research Council, believing his attitude to be one of mere watchfulness of what we were doing not one of cooperation. Only recently, we lent to the Department of the Interior a complete equipment for their repair laboratories which we had purchased from the Imperial Munitions Board. As a matter of fact, they to a certain extent stand in the way of the development of proper laboratories of the type that are required for standardization work.

I have striven to show the departments in Ottawa that there is not only enough work for us all but my whole desire is to give them a chance to do anything they can do within the machinery of their Department. To overcome their hostility has been no easy task I assure you. I have no doubt that in the long run it will come out all right. . . .

RELATIONS WITH INDUSTRY

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 3 MAY 1926

I have just been informed by the Assistant to Mr. Robertson, the local representative of the Canadian Manufacturers Association, that the C.M.A. has decided to bring an influential deputation to Ottawa, representative of various parts of Canada, to urge the Government to provide $150,000 a year for the next three years for the establishment of a National Research Institute under our auspices. They were anxious to know when you would next be in Ottawa, so that they could arrange for this deputation to wait on the Government at the earliest possible moment. It is obvious that the sooner action is taken, the easier it will be to secure a vote in the Supplementary Estimates this year. . . .

TO H. M. TORY FROM J. A. WALKER (MINISTER OF NATURAL RESOURCES OF NOVA SCOTIA), HALIFAX, 31 AUG. 1926

An Associate Committee on Apple Growing and Marketing has been organized in connection with the Advisory Development Council which acts as an adjunct to this Department. . . .

At a meeting of this Committee, held on August 30th, the following resolution was passed:

That the National Research Council and the Nova Scotia Department of Natural Resources institute at once an investigation to determine ways and means to improve the keeping qualities of apples in the warehouses in the fruit sections of Nova Scotia, and we request that a special investigator for the ventilation work be appointed immediately. . . .

There is still needed the services of a special investigator to undertake the ventilation tests and the purchase of a fan and other special equipment. The estimated expenditure would amount to $3,000. for a year's investigation.

I wish to bring the above resolution before the National Research Council and respectfully request that they make a grant of the necessary $3,000. for this investigation. A sub-committee of the Associate Committee, composed of Prof. W. S. Blair as chairman, G. H. Vroom, Col. R. Innes, Deputy Minister, and Prof. A. E. Flynn, will be responsible to the Research Council for the execution of the researches and can act as trustees for the funds.

I trust that action in this matter will be taken promptly as the investigation should start by the middle of September, at which time apples are being taken to the warehouses. In the meantime I will endeavour to locate a technical man suitable for the investigations. . . .

TO A. S. MACKENZIE FROM S. P. EAGLESON, OTTAWA, 10 SEPT. 1926

Re: Storage of Fruit in Nova Scotia

. . . The Council were of the opinion that we should cooperate in every possible way in connection with the proposed investigation. It was felt, however, that the success or failure of the proposed research work would depend to a very large extent upon the qualifications of the individual selected to carry out the work, and as you will notice from Mr. Walker's letter, the part which it was desired that the Research Council should take in this matter, was to provide the salary of the research worker. Attention was called to the fact that a first class expert on ventilation is a very difficult person to find, and it was also pointed

out that the gentlemen who comprise the Sub-Committee which has been appointed by the Nova Scotia Government, have no special qualifications in this particular field of endeavour. Under the circumstances, the Council felt that it was advisable to appoint a small Committee of its own to co-operate with the Committee established by the Provincial Government, and to place the grant requested at the disposal of our Committee. . . .

TO H. M. TORY FROM R. J. MANION, OTTAWA, 21 SEPT. 1926

At a meeting called by the Mayor of Fort William recently, it was decided that some investigation should be made into our iron ores of Northern Ontario and other sections of the country as to the possibility of their being used commercially. They ask that some technical research be made with some offices located at Fort William to deal with this matter.

This appears to me well worthy of consideration, as the building up of an iron industry would be of inestimable value to Canada and we certainly have plenty of low grade iron ores in some parts of Canada, if some method could only be discovered to utilize these ores instead of importing our ores from the United States.

This is for your consideration.

TO R. J. MANION FROM S. P. EAGLESON, OTTAWA, 22 SEPT. 1926

. . . the utilization of Canadian low grade iron ores is a matter which has already received a great deal of attention from this Council and for several years past a Sub-Committee on Iron Ores of our Associate Committee on Mining and Metallurgy has not only carried out special investigations, but has been constantly in touch with all developments which have taken place in both Canada and the United States with respect to the utilization of low grade iron ores.

In this connection I would call your attention particularly to . . . our report No. 14, entitled "On the Utilization of the Low Grade Iron Ores of Canada". . . . I am also enclosing a copy of an earlier report covering a research carried out by W. K. Goodwin on a method of smelting Titaniferous Iron Ore, of which there are enormous deposits in Canada. I may also say that we have now in course of preparation and expect to issue shortly a completed history of the iron mining and iron making industries of Canada.

For your further information, I may say that Dr. Camsell, Deputy

Minister of Mines, is Vice-Chairman of our Associate Committee on Mining and Metallurgy and Mr. John McLeish, Director of the Mines Branch, is a member of the Committee. All our activities on this question have been carried on in the closest co-operation with the Federal Department of Mines, in order to ensure, in accordance with the fixed policy of the Research Council in all such matters, that there is no unnecessary overlapping or duplication of effort.

TO THE HON. T. C. DAVIS (MINISTER OF MUNICIPAL AFFAIRS OF SASKATCHEWAN) FROM H. M. TORY, EDMONTON, 21 DEC. 1926

Dr. Murray has sent forward to me your enquiry about the liquefying of coal. I beg to say that the whole problem of turning coals into oil by the direct use of hydrogen under pressure is being very carefully studied in Germany by Professor Bergius. He has succeeded on a laboratory scale in carrying out such a process but at a cost that has not yet been really determined. He is continuing his investigations and we are watching carefully for the sign of a report that will even give us a hint of its commercial possibilities. . . .

RELATIONS WITH UNIVERSITIES

TO H. M. TORY FROM WILFRID BOVEY,* MONTREAL, 10 APRIL 1926

. . . I understand your view, generally speaking, to be that the Research Council should be responsible for what may be called researches in the technical problems of industry, more especially problems the study of which is not easily to be combined with teaching. I gather that so far as you are concerned the plan for a central institute involves the supply and maintenance of a certain amount of apparatus for such definitely technical researches, and would not prejudice or lessen the work of the universities in more strictly scientific fields. With this proposal it does not seem that any quarrel is possible.

One point I think ought to be borne in mind, which is that there are certain lines in which the universities are equipped to carry out research into industrial problems and to co-operate closely with government departments as well as with industries. Such co-operation as this is

*Wilfrid Bovey, B.A., LL.B., was director of extramural relations and extension, McGill University, 1923 to 1948.—M.W.T.

almost essential for the proper work of faculties of applied science such as those of McGill and Toronto. To be a little more specific, while our plan for the development of instruction in electrical communication calls for a high standard of work in the physical basis of communications, rather than in specialized technical questions of apparatus construction, etc., it is both desirable for the sake of co-operation with the industries interested in this kind of teaching, and for the benefit of the department and its students that a certain amount of specialized graduate work should be undertaken. The same considerations apply especially to the department of Industrial Chemistry which has already been instituted and in which as you know we have established a definite understanding with the Pulp and Paper Manufacturers' Association, and govern indeed the whole of the department of Chemistry. . . .

TO H. S. CONGDON, DARTMOUTH, N.S., FROM H. M. TORY, EDMONTON, 5 MAY 1926

. . . I beg to say that I would not wish you to infer that I was reflecting in any way on the training of the men in the Maritime Provinces. In making the statement I should have added one additional clause and made my sentence read—"Researches are only possible where there are trained men willing and anxious to undertake them and have leisure so to do." The facts are that in Canada to a very large extent our university appointments are based on the idea of teaching only and research incidentally and most teachers are so burdened with teaching work that leisure to think and work on research problems is exceedingly difficult to get. When men are young and strong they will undertake research out of their sleep and rest hours but the power to do that rapidly passes so that many of the men who are equal to the task of undertaking research find themselves physically unable to go on. Often all that is needed to free such men is extra junior help. Many of the professors in the small universities today are doing not only lecture work but all the preparation for classes, all the reading of papers and laboratory demonstrations and under such conditions research is impossible. I think it may be said without fear of contradiction that, judged by their opportunities, our Canadian universities have done remarkably well in research but I crave for our best minds more freedom from deadly grind on other tasks, bread and butter tasks, if you like. Sir Isaac Newton once was asked how it was that he had accomplished so much and he replied because he had been given leisure to think.

I have personally been urging upon the Government of Canada the

necessity for a complete investigation of the fisheries problem on its practical side as well as on the side of the natural resources generally of the Maritime Provinces with a view to determining whether industrial development on a more highly organized scale would not be possible. I see they have appointed a commission to study certain of the semi-political problems. Perhaps, the other will follow at a later date.

The problem that I personally face is the ability to do my own work here and do the stimulating work that is necessary with regard to research in order to get the idea of it firmly established. Only a very healthy body has made it possible for me to continue it so long.

TO H. M. TORY FROM R. F. RUTTAN, MONTREAL, 14 JUNE 1926

In connection with the work of the Faculty of Graduate Studies I have been asked regarding the regulations of the Research Council concerning students registering abroad under Studentships or Fellowships. The concrete case is this, Mr. —— held the Moyse Travelling Scholarship last year. . . . He desires to know whether he would be allowed to go to Berlin and work under Herzog this summer and next winter if permission could be obtained from the Research Council.

—— is a pretty good man and obtained his M.Sc., after one year's work under a Bursary from the Council. He now wishes to perfect himself in a field of research which is quite new on this continent.

TO R. F. RUTTAN FROM H. M. TORY, EDMONTON, 5 AUG. 1926

. . . Now, with regard to Mr. ——, personally, as you know, I have always been in favour of having these scholarships available in other countries than Canada but in this I have stood alone in the Council: you and the other members of the Council have been opposed to it. . . . I shall have ——'s case put on the agenda paper.

TO H. M. TORY FROM HOWARD T. BARNES (DEPARTMENT OF PHYSICS, MCGILL UNIVERSITY), MONTREAL, 4 JAN. 1926

I have your letter of the 18th in reply to my telegram for assistance re the iceberg work. I thought I sufficiently explained to you the action of thermite in pack ice. This is beyond the experimental stage and I wish now merely to demonstrate its explosive action in an iceberg.

I am returning your application forms as there seems to be so many difficulties in the way of getting any assistance that I prefer to seek aid elsewhere. I thought you were asking for big problems of National importance.

TO HOWARD T. BARNES FROM S. P. EAGLESON, OTTAWA, 27 SEPT. 1926

I am directed to inform you that at a meeting held recently, the National Research Council gave very careful consideration to your application for a grant of $1000 to assist in your researches on icebergs and their physical and chemical properties. It was the consensus of opinion that the Council should assist you in connection with this work in every possible way. You will appreciate however, that as the Research Council is expending public funds, in order to avoid criticism, it is essential that before any grant is made, sufficient evidence should be presented to indicate that there is some reasonable prospect of a successful outcome of the proposed investigation. Otherwise, in connection with our many investigations we would be constantly subjected to criticism from all directions, with the result that the whole system of research grants which has been instituted by the Council would be endangered. . . .

. . . The President has been authorized to appoint such a Committee for the purpose of co-operating with you in the planning and carrying out of a definite programme of research on this subject. . . .

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 9 DEC. 1926

. . . Dr. Barnes informs me that before going out on the work last summer, Dr. Macallum had given him a definite promise that the $1,000 for which he had applied would be forthcoming in September. The summer's work had cost him $5,000 and in his arrangements he had definitely counted on the money which he claims to have been promised by Dr. Macallum and when it was not forthcoming last September, he was forced to sell his household furniture, old china, etc., in order to meet bills arising from the summer's research work. I suggested to him that he should write to you direct and inform you of this promise, as I thought it would be advisable to get it on paper. I also pointed out to him that as the Committee consists of six or seven members of the Council, it was, of course, quite impossible for any individual member

to promise definitely beforehand what action the Committee might take. . . .

I am under the impression, nevertheless, that he has at present not the slightest intention of furnishing a report of any kind regarding the work which he has carried out to date. . . .

TO F. E. LATHE FROM C. J. MACKENZIE, SASKATOON, 24 SEPT. 1926

. . . I would suggest that it might be worth while to form a Committee of the Research Council, under say the Chairmanship of Mr. R. B. Young of the Ontario Hydro-Electric Commission, or some other Eastern man and to arrange for a meeting, say in Saskatoon, where these gentlemen from all over Canada who are interested in concrete could be shown the results of Dr. Thorvaldson's work, which after all throws a very great deal of light not only on the alkali problem but on every other fundamental problem concerned with cements and concretes. If such a meeting could be arranged I think it would be possible to clarify the general situation and have the different laboratories at the Universities and private institutions undertake different phases of the work and thus be able to contribute more as a whole than we can possibly do individually. . . .

TO H. M. TORY FROM W. C. MURRAY, SASKATOON, 31 DEC. 1926

Last night I saw representatives of the Wheat Pool who are very much disturbed over the uncertainties of the grading of the tough grain. They told me that they had asked for re-examination of 2400 cars of grain to determine the condition of the grain and in one-quarter of this the grading had been changed.

There is much dissatisfaction in the country, much uncertainty in the market because of it. They spoke first of starting a laboratory of their own. They had seen our work and had come to the conclusion that the University could do it better than they think it would. In talking with them I thought it wise to suggest an interview with you to see if the Research Council might not step in and attempt to attack the problem in a larger way and we thought that the Research Council might bring together the people representing the official grading of the grain, Dominion Grain Laboratory, possibly some representatives of the Milling Company as well as some Pool representatives and a number of scientists. . . .

TO DR. WIENER (AGRICULTURAL COLLEGE, WINNIPEG) FROM H. M. TORY, EDMONTON, 15 DEC. 1926

I received a few days ago a letter from Mr. Eagleson with regard to your application regarding ——. I fear you have completely misapprehended the position —— occupies on your staff. Let me call to your mind the distinction between a student having a scholarship and one being engaged on a research. If a student backed by a professor applies for a bursary or studentship he does so with the distinct understanding that the bursary or scholarship is to be used for training purposes, that is, the man is to receive instruction and training. Before such a grant is made the qualifications of the student have been submitted to the Research Council and approved so that the Research Council is aware of the possible fitness of the man to undertake training for further research.

When, on the other hand, a professor is given a grant for the purpose of prosecuting a research, and he applies to have the money applied in employing an assistant, the matter of that assistance is left entirely to the professor, because the research is regarded as belonging to him. Such a grant is not made to assist a student in training, but solely for the purpose of assisting the professor in getting his research forward. Under those circumstances an assistant is not supposed to be a student in the ordinary sense of the word or to be following a course leading to a degree. It is quite possible the work he did might lead in that direction but that is not the primary motive of the grant. I am sure, therefore, I am speaking for the Council that it is impossible for you to pay —— while he is working for a degree. That would be treating him as a bursary or scholarship man, not as an assistant at all.

Neither could —— for a moment engage someone and pay him out of the income he receives. When —— ceases to work for us he ceases to receive salary, and you must personally take the responsibility of securing another assistant.

With the regard to the use of the material, I do not think the Committee would object to the material being used but they certainly would insist that before being used, it ought to be submitted to the Council, as it will be regarded as their property. This material belongs to us as one carrying out an assistant research for the Council and not to ——; and as the work was paid for with our money we have a right to priority in the use, if we so desire.

The whole matter will be submitted to our Committee meeting to be held in the near future.

1927

". . .When scientific revolutions come, they come as integral and delicately balanced parts of total social revolutions. The conditions for them will have been maturing for many years. Unconsciously, inchoately, continuously, there has been adjustment over a protracted period, a long approach to some critical and fateful balance. And so, when such a revolution finally occurs, it is likely to come with lightning speed. The time when critical courses can be taken, critical decisions made, may be short. All too soon, for good or ill, a pattern may become firmly set. . . . In such a time wisdom in planning is priceless. So also is wisdom, as well as speed and decisiveness, in action. Once critical steps are called for, there is not long to act, and afterward it may forever be too late. . . ."—Caryl P. Haskins, 1961

THE INNER RING

In 1927, Tory was 63 years old, and had already founded three universities plus an assortment of other institutions, such as the Scientific and Industrial Research Council of Alberta. He was a professional founder-and-first-president, and at this time was still the first President of the University of Alberta. This lifelong habit may have been a factor in his decision to found and also become executive head of the National Research Laboratories—as well as the first chairman of the Advisory Council to call himself President.

But some of the members of Council had other views. Hume Cronyn was a business man, and it is said to be foreign to business ways of thinking for the Chairman of the Board of Directors to be

also President of the Company. (Can it be that Chairman of the Board is used as a kind of Senate—filled on merit often enough so that no one notices when you use it as a dumping ground for inconvenient Presidents?) Cronyn ventured to tell Tory that he hoped that Tory was not planning to occupy both positions simultaneously.*

Tory replied that, in his opinion, the reason for the failure to secure laboratories in 1921 was government reluctance to create a double-jointed institution, with two separate sets of highly paid officers. He was convinced that no such separation was necessary for at least ten or fifteen years.* He thought that four directors of divisions could handle the administration of laboratories under the President of the Advisory Council as executive head.

Cronyn said he would go along with this, though he was not yet converted—but the Director of the Bureau of Standards held no position in the American Research Council.* Tory replied that the Bureau of Standards was founded long before the American Research Council and that there was no association between the two bodies. He pointed out that the President of the Massachusetts Institute of Technology was also the Director of all the Institute's activities with the aid of a group of deans.*

McLennan's opposition to Tory was on the ground that, if Tory won his point, trouble would arise from groups of technical civil servants. The new laboratories would then be one more institution among equals, but more equal than the others because of its closely associated advisory council. He thought the Research Council should be above all that.* Tory replied by pointing a finger, trembling with horror, at the possibility of the laboratories coming under a government department.*

Macallum's opposition to Tory on this point was based on the vastly different thesis that Tory simply was not competent to direct the laboratories.* This led to the interchange of small vintage histories of the Research Council, each filtered through a thick layer of autobiography. Even when they used the same grapes, Tory produced a ruddy port, full-bodied with faith and hope,* while Macallum's product was clear white and extremely dry.*

*Letter quoted in this volume.

Macallum took advantage of the enmity between Tory and R. B. Bennett in an attempt to crush Tory from above, by way of the Cabinet,* for which act Tory describes Macallum as an "old fool, having by his tongue jeopardized the whole project." This interesting manoeuvre was countered by A. L. Clark in a letter to the Prime Minister's office, remarking that "You know perfectly well the make-up of the Council and also how difficult it is to get complete unanimity in such a group. . . . I think it was a real triumph for Dr. Tory when he was able to persuade them all to adopt his point of view. . . ."*

In fact, so far as the official attitude of the Research Council was concerned, a compromise had been reached regarding the laboratories. The members of Council, as a body, forced two amendments to Tory's plans. The first amendment was to soften Tory's absolutely solid "usefulness" attitude; the members would not stand for an unbalanced structure that had no place in it at all for pure research; and they felt so powerfully on the point that they instructed Tory to make definite and unmistakable provision for some pure research in the new laboratories. The second amendment was to accept that the President of the Advisory Council would also be "Director" of the new laboratories, but Tory was instructed to insert the words "for the present" (1).

So Tory had won. But the cited correspondence adds a dash of pepper to the bony official minutes, especially the statement: "prolonged discussion ensued."

THE RING OF PARLIAMENT

Science and technology were of so little moment to most members of parliament that no word can be found respecting such oddities in the voluminous memoirs of Borden and Meighen, or even in the memoirs of Sir George Foster. In 1927, after ten years of campaigning, this small matter had become slightly less peripheral. But it was still only a minor part of the concerns of the Cabinet.

From this extremely narrow standpoint—the welfare of the scientific community—the various ministers had begun to remind scientists of the little girl with the curl in the centre of her forehead:

when they were good they were very very good, and when they were bad they were horrid. A minister of really impressive stature, such as Sir George Foster, was likely as not to be followed by narrower men incapable of listening, wearing a thick carapace of arrogance and glorying in their unteachability. This was a basic problem in communication; since scientists were well down near the bottom of polite society, only a Minister who was willing to listen to *anybody* could achieve the tolerance needed for listening to scientists. Regardless of party, tolerant cream and intolerant scum were equally likely to rise to the key position; the trick was to know which was which quickly and to act accordingly.

As soon as Tory discovered that his new Minister was not an anti-intellectual, but was quite prepared to listen to all kinds of people, and to grasp what was said to him, he lost no time. He pointed out to James Malcolm that: "we remain the only country in the world which does not provide laboratories for the standardization of its own materials . . . if this state of affairs is allowed to continue, we will have no right to complain if in the long run we find ourselves becoming a nation of peasants and traders, while the wealth derived from our natural resources goes to swell the coffers of people having greater initiative than we apparently possess. . . . Canada, the greatest of all the British Dominions, is the only one that has not yet established national laboratories for research. . . ."*

What a pleasure it must have been to be listened to, instead of having your facts and figures and comparisons with other countries rebounding uselessly from the perfect defences of indifference. Now there was an opportunity for scientific proposals to be considered and judged along with many other factors.

For Tory, in amiable communication with a first-class minister, all systems were green, and soon he was concerned about "real expansion," in which event he would alter the membership of the Council.*

Tory's expressed desire for new blood on the Council stemmed in part from Sir Arthur Currie's suggestion to have Ruttan and Macallum replaced by younger men.* But the relationship with Macallum rapidly deteriorated when the news broke that laboratories might be forthcoming at last, whereupon Macallum let it be

known that he was opposed to the idea that Tory should become executive head of the new institution.*

THE CIVIL SERVICE RING

To soothe the wounds inflicted by Macallum, Tory applied a poultice of self-praise.* In this statement is the observation that, when he came to Ottawa, he found himself surrounded by extreme hostility on the part of the civil service. He had tried to restore confidence in the motives of the Research Council and had "succeeded beyond my greatest expectations . . . the opposition no longer taking the form of studied attacks by approaching Members of Parliament."

Tory did not tell Macallum exactly what form the opposition *did* take in 1927. The deputy ministers of Mines and Agriculture were now members of Council. However, Camsell, who had cooperated in so satisfactory a manner about the work on magnesite, had begun to complain. The Council was free to do sensible things about men and money, while Camsell had to struggle with the frustrating controlling agencies of the Civil Service Commission and the Treasury Board, instead of getting on with the job. This galling contrast was brought into sharp focus by the transfer of Mr. A. F. Gill from Camsell's staff to that of the Magnesite Committee of the NRC. Camsell bitterly foresees that "This would force upon us the onus of going through the present procedure required by the Civil Service Commission in selecting our employees—a procedure which requires from two to five months—only to find that we are acting as a recruiting and training organization for the benefit of the Research Council."* Camsell went on to say that the relationship between the Research Council and technical government departments needed full discussion and a clear statement of policy.

A few more deputies as competent, frank, and clear-headed as Camsell would have saved the country a good many royal commissions. As things were, a civil service so throttled and muzzled by controls was fortunate indeed to have a single Camsell in its ranks.

Relations with the Department of Mines, tense as they were, constituted a model to be envied in comparison with the relations

between the Research Council and the Departments of Agriculture and of the Interior. During 1927, Tory was once again submitted to pressure to add Mr. Cory, Deputy Minister of the Interior, to the membership of the Research Council.* Once more he refused,* telling Cory's Minister that Cory was unlikely to give the necessary cooperation. He spelled this out to Camsell by the same post, saying that he was aware that Cory had given instructions to his staff not to mention the NRC in their literature and not to give NRC any information.*

As a matter of record, Cory was entirely successful in suppressing the fact that NRC had started the forestry work at Petawawa in 1917 with a grant of $6000 (2), had supported the work of Cory's department in this area for four years (3) to a total of $26,000, and, much more important, had had an associate committee on forestry going in 1917 with no other function but to expedite the work at Petawawa, a committee which was disbanded by the NRC in 1921 when the Department of the Interior had finally become strong enough to do this work without further support (4).

From that time forward, no word of NRC support for forestry was permitted to appear in the statements issued by the department. This irritated Tory and made Eagleson angry for years on end. But in the end, Cory had won; nobody remembered that the Research Council had ever had anything at all to do with forestry research at Petawawa except for Frank Adams, who had started the whole thing (5), plus one or two others, who gradually ceased to care. However, in 1927, when the Council needed all the evidence it could muster to prove its usefulness and its germinal qualities, this prickle of injustice still rankled.

In May of 1927, Eagleson reported in detail that a forestry official had refused to give the Council any information about the seasoning of timber,* and Tory replied that he was not at all surprised.

The Department of Agriculture, under Grisdale, had cooperated with the Research Council on the wheat rust investigations. However, the departmental attitude towards the tuberculosis research committee in 1927 was described by Tory as "openly antagonistic,"* and he speculated that perhaps the department had been bluffing

about their work in this field. According to Eagleson,* Grisdale repeatedly indulged in deliberate obfuscation.* Eagleson felt that "There is no use in shutting our eyes to the fact that at the present time there is no genuine spirit of cooperation in evidence between the various scientific divisions of the Federal Government Departments at Ottawa and personally I have many times felt that some of the Departments were more concerned with preventing encroachments on what they consider to be their preserves than with the importance of getting the work done."* And certainly the tone of Grisdale's letters to Tory could hardly be described as sympathetic (6, 7). Also, Grisdale managed to block any representation of the Research Council at an Agricultural Research Conference, although all the other research councils in the Empire were represented.* As Eagleson put it, "in matters of this kind Dr. Grisdale must be considered as Deputy Minister of Agriculture rather than as a member of the Research Council."

If this sort of thing could be regarded as an improvement in restoring confidence in the motives of the Research Council, beyond Tory's greatest expectations, it may be a measure of his horror of the previous "attacks by approaching members of Parliament." In his value system, it was a great advance to be attacked in the style of 1927 rather than in the deadly fashion of 1921. The battle was now far more personal, and since all the virtues were obviously on his side, truth would ultimately prevail. The air about Tory was never still for very long; he moved always to the snapping flutter of banners; and the drums he sometimes set to rolling were not always muted. Whenever he was able to draw in more of the existing antagonism towards himself, he felt more certain of the outcome. At any rate, current events that dismayed Macallum and Eagleson were viewed by Tory, in his wider time-sense, with vigorous and enthusiastic hopefulness.

This difference in outlook may be one clue to Tory's anatomy of leadership. One aspect of leadership is the ability to feel more responsive towards time; to pay more respect and more concentrated attention to the past and therefore to feel more certain of the future. Such men look beyond the moment and are hopeful; they feel that vigorous action in the "now" cannot help but have considerable effect on what is to come. The followers, with a narrower

time-sense, are initially attracted by the vigour of the leader, and are subsequently hooked by his stronger belief, and especially by his greater hope. Tory's time-sense—the segment of time to which he was able to respond—happened to be of just the right order for the founding of institutions.

IN THE OUTER RING

Tory judged that substantial support for industrial research would be politically expedient.* In this he seems to have been an accurate observer, since G. Howard Ferguson jumped on the research bandwagon with a spectacular announcement of provincial intent. Frank Lathe therefore suggested to Tory that the time was ripe for a conference with the provinces, on who should do what in the field of research.* Tory, in his turn, made the same suggestion to Malcolm.* A Dominion-Provincial conference was held, and Tory turned in a star performance on behalf of the federal government.

Incidentally, it appears that this conference of Prime Ministers came about because Lathe suggested that it should. This is an interesting example of the workings of democracy: a competent follower *may* have an effect on his peerless leaders, and there *is* an arrow going back in the other direction, after all: Lathe to Tory to Malcolm to Mackenzie King.

At Malcolm's suggestion, Tory sent copies of his speech to all provincial premiers, including G. Howard Ferguson.* Ferguson said he would refrain from any further movement except, maybe, in a very general way.* In the next week, however, by a neat bit of verbal judo, G. Howard Ferguson used Tory's speech as material for a speech of his own to the Canadian Manufacturers' Association.* It was a very effective speech on both occasions.

When Ferguson announced the beginning of the Ontario Research Foundation, Tory felt betrayed. In a moment of despondency he told Eagleson: "If it were not for you and Lathe, I would feel like pulling out of the whole thing."* However, he quickly rallied and returned to his cheerful policy of using Ferguson's activities for smartening the pace of the unwieldy federal government,* who had slowed to a walk because of fiscal worries.* After all, Tory had had

more experience at founding institutions than Ferguson, and was at least equally adept at using a rival for a stepping stone.

REFERENCES

1. Min. 30, 73rd Meeting, NRC, Oct. 11, 1927.
2. Min. 30, 3rd Meeting, NRC, Feb. 13, 1917.
3. Min. 13, 38th Meeting, NRC, Feb. 21, 1921.
4. Min. 20, 42nd Meeting, NRC, Sept. 15, 1921.
5. Exhibit J, 3rd Meeting, NRC, Feb. 13, 1917.
6. Letter, J. H. Grisdale to H. M. Tory, March 8, 1927. NRC Papers, National Science Library.
7. Letter, J. H. Grisdale to H. M. Tory, Sept. 12, 1927. NRC Papers, National Science Library.

DOCUMENTS

INTERNAL RELATIONS

TO H. M. TORY FROM SIR ARTHUR CURRIE, MONTREAL, 1 FEB. 1927

. . . Some time I want to have a chat with you about the Dominion Research Council. I know that Dr. Ruttan and Dr. Macallum are members of that Council and have been for some years. I suppose they are regarded as McGill's representatives, but since I have been here (now nearly seven years) I have no recollection of the University ever being asked to nominate any representatives. Perhaps there is no reason why they should be asked, but to satisfy my curiosity will you tell me how the Council is named.

There is another matter which I wish to bring to your attention now and it is one concerning which I think Dr. Martin has spoken to you. You will remember that Dr. Pettit inaugurated under the auspices of the National Research Council Fund some work on Tuberculosis vaccination. Dr. Pettit has gone and it is our intention to take over some of this

work. Dr. F. C. Harrison, late Principal of Macdonald College, is now devoting all his time to research work and has his laboratory in our Pathological Building. Dr. Fleming is the head of our Public Health Department and would co-operate with Dr. Harrison in the making of cultures, etc. They will use as clinical material the children in the various institutions affiliated with McGill and in the Health Centres. I hope that we may receive some grant from the National Research Council to help us carry on this work. We are supplying Dr. Harrison with an Assistant at once, because we are anxious to begin immediately.

I hope the Research Council will grant us some measure of help in this matter. . . .

TO SIR ARTHUR CURRIE FROM H. M. TORY, OTTAWA, 17 FEB. 1927

. . . With regard to the appointments of the Research Council the situation is as follows:

When the Research Council was first organized in 1917, Dr. Ruttan and Dr. Frank Adams were appointed from McGill University and Dr. McLennan and Dr. Macallum from Toronto University. At the first meeting of the Council Macallum was made its chairman. Later on, having failed to accomplish certain things he desired and having mixed things up generally he was appointed to McGill and resigned as Chairman but retained his seat on the Council. Since that time three McGill men have been on the Council and one from Toronto.

Under the Act appointments are made for a period of three years. Up to the present, the government has allowed the Council to nominate the successors of those who retire by rotation. Last year, Macallum and Ruttan retired by rotation and as neither of them suggested that they retire in favour of someone else, the Council set their names up for reappointment and they were reappointed. My own position has been a difficult one as when I find myself in opposition to them they assume that I am opposed to McGill. This McGill-Toronto opposition and jealousy is to me incomprehensible on the part of men of training.

It has never been the practice to ask the universities to nominate nor has it been the practice to give university representation in any formal sense. The idea was that fifteen men would be selected from across Canada to guide the work of research and naturally men from old institutions like McGill and Toronto were given the preference. Personally, I have only been on the Council for three years. When I went there, I found most of the Council ready to resign and quit. The position which the Council occupies at the moment is due very largely to the energy

which I have put in it. I have tried to give it a position of responsibility before the public and to interest the Government in its welfare.

I do not mind saying to you privately that I think McGill could be much better represented on the Council than it is at present. Macallum is a man who always plays a lone hand. For example, when the tuberculosis work was first organized his view seemed to be that his department was not able to undertake the work and therefore McGill would not for the moment participate. My opinion is that he did not believe we would get the research organized. One of the problems I have had to face continuously is the internal clashing that takes place between men like Macallum and Ruttan on the one side and McLennan on the other. When I went to the Council it was handing back to the Government $30,000 a year of the $120,000 that was voted. Last year, we spent $155,000 and this year we asked for an additional $20,000. I am of the opinion that the time is not far distant when the personnel of the Council will have to be reconsidered.

With regard to the grant for tuberculosis research I have no doubt that a moderate grant could be made. Of course, as you probably know, the money voted was assigned originally to the University of Montreal, the Connaught Laboratories, a small grant for bovine tuberculosis to Alberta and reasonable grants to two sanitoria where work has been carried on. Our chief interest in Alberta was the testing out on a large scale the Calmette vaccine process. This for the moment looks very hopeful. The Connaught Laboratories were selected because they were the only laboratories with a special endowment devoting their whole time to the making of vaccines and carrying on Bacteriological research. . . .

TO THE HON. CHARLES STEWART FROM H. M. TORY, EDMONTON, 14 APRIL 1927

. . . In the recommendations which the Council put forward this year they advised the continuance of the five members who had served last time. I consented to that recommendation primarily for this reason that so long as the Research Council is left to do only what it is now doing, there seemed to be no serious reason for a change. The burden on my back has been pretty heavy because of certain persons on the committee but I have been able to handle it without serious interference. If on the other hand the Research Council's organization is to be extended as I understand Mr. Malcolm really intends to do, then the whole question of the personnel of the Council will have to be brought under review and changes will have to be made. I would consider it necessary, if we should

undertake the planning of a more progressive scheme, that new blood be brought into the Council. In this I am sure I have the backing of the more thoughtful men of the Council and in the universities. When that time comes, and I assume it will come soon, then the question of what additional members of the Civil Service as at present constituted are to be added will be a subject of careful consideration. . . .

TO THE HON. JAMES MALCOLM FROM H. M. TORY, OTTAWA, 24 APRIL 1927

At a recent meeting of the Research Council the question of the appointment of persons to fill the place of those retiring under the Act was considered. . . . If we are to undertake some real expansion, then some new blood must be brought into the Council, men belonging to the younger generation of scientists. That is a matter however that we can consider when we are discussing the other aspects of the problem. The adjustment can be made either by asking for the resignation of the Council subject to reappointment or by amendments to the legislation which would bring the matter back into the hands of the government again. . . .

TO H. M. TORY FROM F. E. LATHE, OTTAWA, 9 JULY 1927

I am enclosing the front page of last night's Citizen, since you will be interested in the latest report regarding the Research Council. This is, I think, the first time that we have figured in front-page headlines.

You know better than I how much truth is in the announcement regarding the Sussex Street site for National Research Laboratories. Possibly this report is only a feeler and need not be taken very seriously. In considering the question of a permanent site, however, there are many factors to be considered and my present feeling is that we might do well to follow the example of the Bureau of Standards and select a site in the suburbs. Their location, as you know, was, at the time the laboratories were erected, well outside the city of Washington, and they considered it necessary for their standardization work to be away from the industrial centre of the city, in order to avoid mechanical and electrical disturbances. I well remember that Dr. Cox told us in 1900 at McGill that some of their readings had to be taken after midnight when the cars on St. Catherine Street ran only every half hour. We may not at first have any work which calls for such precision but I feel strongly that we should bear in mind the possibility of such developments when we are deciding on a permanent location. . . .

TO A. S. MACKENZIE FROM S. P. EAGLESON, OTTAWA, 6 JULY 1927

You will recall that at its last meeting the Research Council had under consideration an application for a research grant from Father —— of the Oka Agricultural College, and it was the consensus of opinion that he should have applied for a scholarship, rather than for a research grant.

An application for a studentship has now been received from Father —— and in view of the desirability of an early decision in the matter, I have been directed by the President to send to you for your consideration and decision by letter ballot, as Chairman of our Standing Committee on Scholarships, the enclosed copy of the application in question and of correspondence with regard thereto. Would you please be good enough to advise me as soon as may be possible of your vote regarding this application.

For your information, I may say that Dr. Tory, under the circumstances of this case, is in favour of granting Father —— a special scholarship of the value of one thousand dollars, on the distinct understanding that this action should not be regarded as establishing a precedent. . . .

TO S. P. EAGLESON FROM R. F. RUTTAN, MONTREAL, 16 JULY 1927

Would you kindly inform Dr. Tory that it is after considerable hesitation that I cast my vote in favor of giving a studentship to Father ——, particularly as the period for granting studentships, etc. is long past, and I do not think that anything of importance will come from his work. Nevertheless, as the President wishes to grant the studentship, he may count my vote in favor of granting it.

TO A. S. MACKENZIE FROM H. M. TORY, EDMONTON, 25 JULY 1927

I cannot allow you to put me in the position of acting from the point of view of expediency or policy in this matter. . . . The impression left on my mind at the Council meeting was that if Father —— applied for a scholarship we were all favorable to giving him a chance for further study as he was working in an agricultural college. The special consideration was therefore not on my initiative but came spontaneously from within the Council. Please therefore vote in this case entirely on the merits of the case and without reference to my particular feelings in the matter.

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 22 NOV. 1927

Dr. McLennan's address to the Professional Institute of the Civil Service on the subject of "Science and the Civil Service" took place at the luncheon opening the annual meeting of the Institute yesterday. . . .

He then pleased all and sundry by inquiring whether the Ministers and Deputy Ministers gave to the scientific workers in the Government Service freedom to develop their capacities "within the limit of the positions to which they had been called." He suggested that this be taken as the text of his address.

He then followed this up by repeating the inquiry as to whether the Ministers and Deputy Ministers fully appreciated the importance of the work which is being carried on by the scientific men in the Government Service, whether they support them adequately in their work and whether their salaries were sufficient.

He stated that when the Research Council was in the process of organization in the early stages of the war, he had been approached by Sir George Foster (who was sitting at the head table) and shown a draft of an Order-in-Council establishing a National Research Council for Canada and that Sir George had done him the honour to offer him the directorship of the Council, but that after full consideration he had come to the conclusion that there was not sufficient assurance that those in authority adequately recognized scientific work or offered that freedom of action which he considered so essential, to justify him in accepting the offer and he had consequently chosen the other path and remained in the University. He stated that it almost made him despair when you told him of the difficulties which you had experienced in even securing an interview with Cabinet Ministers, the plain inference being that this was a very definite indication that his judgment had been correct. . . .

Coming back to Canada, he stated that the truth of the matter was exactly as you had stated, that we were suffering in Canada, particularly our men in high office, from an inferiority complex, that we were not convinced that Canada could and should do things for herself. . . .

The Chairman called on Mr. Stewart to move a vote of thanks, which he did in a very neat little speech. He stated that he was placed in a difficult position as a member of the Government to move a vote of thanks, in view of all that had been said, but that he thoroughly recognized the force of Professor McLennan's remarks and that he was confident that the technical men of his own Department at least would not lay at his door any responsibility for any inaction which may have existed in the past. He was glad to see that members of the Civil Service

Commission were present and had heard all that had been said on this question (the Civil Service Commission is at present supposed to be considering a reclassification of the salaries of the technical service of the Government). He stated that he had just returned from Germany and that if he had needed any incentive to convince him that we must move forward in research in Canada, it had been furnished by what he had seen in that country.

On the whole, as I have already said, I consider, and Lathe agrees, that Dr. McLennan's address was entirely satisfactory to the technical employees of the Government and coming from him, his candid remarks regarding the apathy of those in high places will probably do more good than harm.

RELATIONS WITH CABINET MINISTERS

TO THE HON. JAMES MALCOLM FROM H. M. TORY, OTTAWA, 16 JAN. 1927

. . . As it has become generally recognized that Canada is not to follow the procedure of the United States in granting further tariff protection to industry, I would respectfully urge that the most effective alternative for assisting both agriculture and industry in Canada is by means of a definite research programme and that such a programme is worthy of being made a definite piece of Government policy.

During the past few years, as President of the Research Council, I have come in contact with leaders of public opinion throughout the country generally and I am confident that if the Government were to frankly launch out on a policy of encouraging research, it would be surprised at the popular response which would follow and that public opinion throughout the country would rally to the support of such a policy.

Some two years ago I suggested to the Government that the after-war surplus of the Wheat Board, amounting to something over $500,000 be made a foundation for the purpose of promoting research. The Government, however, considered it advisable to hand this over to the provinces. Some of the provincial leaders, sensing the very thing which I had suggested, immediately devoted the money to research and the credit for this has consequently gone to the local government, instead of to the Dominion government.

Heretofore, I have hesitated to be unduly insistent both before the

public and before the Government, because I knew the difficulties under which the affairs of the country were being administered. Without any desire to encroach upon the field of politics, I have now no hesitation in expressing the conviction that if an aggressive research programme were adopted by the Government, it could in a very few years be made to play such a part in the industrial and agricultural development of Canada as to arrest the attention of industrial leaders and command the attention of the public. . . .

I therefore respectfully urge that provision be made in the estimates this year, looking to the establishment of laboratories in Ottawa under the auspices of the National Research Council. A large amount would not be necessary to start with—an initial sum of $250,000 on capital account would be sufficient—but it should be recognized that some expenditure over a period of years would be necessary. . . . Of course, if the whole programme could be hastened by a sufficient vote for the first unit, we would more promptly reach the position of public recognition referred to above, which from the Government's point of view might be the part of wisdom.

If such laboratories are made available, I am confident that considerable sums of money will be immediately forthcoming from private sources for the prosecution of research. I know of cases at the moment where industries of Canada are paying for research done in laboratories in the United States because facilities for doing such work are not at present to be found in Canada.

We already receive a grant of $10,000 a year for five years to help us with research work on tuberculosis.

I am enclosing an application which came to us from the Maritimes General Supply company with regard to laundry soap and a copy of an editorial from the "Electrical Times" of London, both of which are interesting to read. In one case the question of whether a soap can be used by laundrymen in Canada is determined, with the assistance of the Canadian laundry industry, by a laboratory at Joliette, Ill., affiliated with the Mellon Institute, and in the other case it would seem that a boycott is practically established by an American laboratory in the city of Chicago against Canadian and British equipment. This must inevitably become common practice so long as we remain the only country in the world which does not provide laboratories for the standardization of its own materials. It is hardly necessary to add that all this operates against the development of our own natural resources.

Only yesterday I had submitted to me samples of insulating material made in the United States from eelgrass collected on the shores of the maritime provinces, which had been taken to the United States, fabricated

in American factories and returned to Canada for use, we paying a 25% duty on the product. I have also been informed that only recently a product was imported into Canada for insulating purposes in which sawdust played an important part, the testing and recommendation of which were also made by outside laboratories.

I respectfully suggest to you that if this state of affairs is allowed to continue, we will have no right to complain if in the long run we find ourselves becoming a nation of peasants and traders, while the wealth derived from our natural resources goes to swell the coffers of people having greater initiative than we apparently possess.

It might further be pointed out that Canada, the greatest of all the British Dominions, is the only one that has not yet established national laboratories for research, and this notwithstanding the fact that it is obviously impossible for the National Research Council of Canada to carry out many of the functions and duties assigned to it by Parliament without such facilities.

TO H. M. TORY FROM THE HON. JAMES MALCOLM, OTTAWA, 27 JAN. 1927

I thank you very cordially for your personal letter of the 15th instant, giving me some idea as to the Research Work being carried on at the present time in Great Britain and the United States. I have no doubt that this material will be very useful in justifying whatever expenditure the House may authorize. I have not as yet had time to read it as carefully as I wish, and will write you more fully when I have done so. In the meantime, I hope you will accept my sincere thanks for your thoughtfulness in preparing such a comprehensive memorandum on the subject.

TO H. M. TORY FROM A. L. PATERSON, OF WILSON, PATERSON, GIFFORD LTD., MONTREAL, 8 FEB. 1927

As representing those who are interested in the development of the Magnesite Industry in Canada, I want to let you know how much we appreciate what the Research Council are doing for us.

We had the pleasure last week of having a conference in Ottawa with Mr. Lathe, and all of his men who are interested in Magnesite Research, and came back feeling very much encouraged with the results that they are getting. The work being done by Mr. Lathe and his associates is very thorough, and we are sure is leading us very quickly toward practical results that will be of great assistance to the Magnesite industry in this

country. The work which is being done in Ottawa, coupled with the work which we are doing ourselves, is going to develop new uses for this material, and is also going to enable us to produce a better material than we are now able to produce, so that we feel very sanguine about the future of Canadian Magnesite, and we want you to know that this progress is being very materially assisted by what the Research Council are doing to co-operate with us.

As I have not had the pleasure of seeing you and discussing this personally for some little while, I am anxious to convey to you the sincere appreciation of those of us who are interested in the Magnesite Industry, of the thorough research work which is being done under the guidance of your Council.

TO H. M. TORY FROM THE HON. CHARLES STEWART, OTTAWA, 8 MARCH 1927

I have your letter of the 1st instant and note that you have now organized a Committee on Wheat Research. I think this should be very valuable. I was talking to Tom Low, who is engaged in the milling business, and he advised me that this was a matter which might very well be investigated.

I saw Gordon Edwards last week and he told me that negotiations for the purchase of the Edwards property were going on nicely with the International Pulp and Paper Company. As soon as we get a definite price, if it is reasonable, I will press to have an amount placed in the estimates.

TO H. M. TORY FROM F. E. LATHE, OTTAWA, 16 APRIL 1927

You may be interested in the following announcement which appeared in yesterday's Citizen:

TO CREATE INDUSTRIAL RESEARCH INSTITUTION

(Canadian Press)

TORONTO, April 14.—It was announced here today by Premier Ferguson that the Ontario government purposes to foster creation of an industrial research institution with an endowment of perhaps $2,000,000, for the purpose of solving scientific problems of production and processing for Canadian industries and natural resource developers.

In view of the above and the announcement which Mr. Malcolm made

in the House the other night . . . you may wish to take up with Mr. Malcolm in the near future the question of calling a conference of dominion, provincial and university officials and representatives of industry to discuss the whole question of the proper allocation of scientific and industrial research problems and co-operation between the various research organizations. This is only a suggestion but it seems to me that if such a conference is to be held the time is now ripe for it.

TO THE HON. JAMES MALCOLM FROM H. M. TORY, EDMONTON, 20 APRIL 1927

I wonder if your attention has been called to the following announcement [see preceding letter].

. . . This indicated that what I have feared for a good while would happen is likely to happen, viz. that we have delayed so long at Ottawa in fostering a real institution while at the same time public opinion was being built up with respect to it that now Premier Ferguson sees the political soundness of such a scheme and is therefore simply setting himself to steal the thunder and the consequent political kudos which rightly should belong to the Dominion Government. I foresee now the same kind of rivalry and possible waste in research organization as heretofore has taken place between local government departments and Dominion departments, unless the Dominion Government frankly undertakes the thing on such a scale as to give leadership to the whole movement. Three years ago, I suggested to the then Minister of Trade and Commerce that if he was not careful this very thing would happen. I am looking forward to a full discussion of the whole matter with you on your return from England. My momentary impression is that a conference of the provincial and Dominion authorities on the matter should be called after some plan has been matured which will give the leadership to the Dominion authorities that they have the right to demand.

TO H. M. TORY FROM THE HON. JAMES MALCOLM, 28 APRIL 1927

I have your letter of April 20th and was exercised myself with regard to the article you refer to, fearing as you did, the very unfortunate situation that would be created should Premier Ferguson undertake Research work on the scale suggested. I will have a conference with my colleagues in the Government regarding this before I sail and will give some publicity to our avowed intention of working out a substantial plan this year.

Confidentially I may tell you that had it not been for the desire to

close the House early and the criticism of our Estimates which took place, it would have been quite possible for me to have had a substantial vote in this year. The Government however felt (although I did not agree with all my colleagues) that we were submitting sufficient expenditure for the country this year. My personal feeling was however, that this was a progressive and constructive vote and would help with the other votes.

Immediately on my return from England, I am looking forward to having a very thorough discussion with you on this point.

TO H. M. TORY FROM THE HON. JAMES MALCOLM, 30 APRIL 1927

With reference to yours of the 14th inst., it is with great regret that I have to inform you that our expenses in connection with the work of the Grain Research Laboratory will have to be squeezed out of the General Vote. Confidentially I may tell you that the Treasury Board cut out all my extra appropriations but I did get permission from Council to make the announcement that during this year plans were to be made for an extensive enlargement of the whole service so that during the year I look forward to Mr. Stewart and yourself having several conferences with me towards bringing down a quite extensive appropriation next year.

I am sorry for the delay but I am sure that in the general interests of the work in which we are interested, it will be much better eventually.

There was so much discussion as to the size of our Estimates this year, that the Treasury Board felt something had to be done and we were all asked to reduce our Supplementaries as much as possible.

TO H. M. TORY FROM H. H. STEVENS (VANCOUVER HOLDINGS, LIMITED), VANCOUVER, 15 JUNE 1927

In acknowledgment of your very kind letter of June 6th I wish to say that I have delivered one or two other addresses in support of the establishment of a Research Laboratory and a Bureau of Standards in Canada, speaking before the Board of Trade and the Manufacturers' Association of this City, and in each and every case I find a most hearty response to the appeal that I make and these bodies are using their influence in bringing pressure upon the Government to secure the necessary support. I have made all my appeals on a wholly non-partisan basis and have always taken great care to pay generous tribute to Mr. Malcolm, the Minister, as well as to the National Research Council for their splendid work under such great handicaps.

I would like to suggest to you that your Council should influence as

far as possible all independent thought to support them in their effort in inducing them to set aside the necessary funds at their next session.

TO HUME CRONYN FROM H. M. TORY, EDMONTON, 25 JULY 1927

. . . Apparently, Mr. Ferguson has sensed more rapidly than Mackenzie King the political significance of the scientific movement and has publicly made a statement that he proposes going forward with a scheme for scientific research. I immediately called Mr. Malcolm's attention to the matter and told him that if the Dominion Government did not get promptly into the field with a statement of its intentions that it would find not only the ground out from under its feet but that we would have launched on another wasteful scheme of provincial competition with the Dominion Government of which this country has seen so many foolish examples. Malcolm himself has been favorable to a progressive policy since he became Minister.

With regard to the laboratories, the first time I saw Malcolm he promised me that action would be taken. The real difficulty has been with the Prime Minister. Malcolm and Stewart are standing firmly for the laboratories and I am sure they are being backed by men like Ralston. I understand also that Mr. King* has become favorable.

I noticed in a recent article in "Nature" on the organization in England of a Research Council for the Crown Colonies that special attention is called to the difference in attitude between the Prime Ministers of the Dominions at the Imperial Conference of 1926 as compared with the Imperial Conference of 1923. In 1923 the question of scientific organization received practically no consideration. The mentality of the Conference was bent on political solutions of the Empire problems. At the Conference of 1926 there was a unanimous opinion that science should be given a foremost place. Perhaps, that accounts somewhat for the changed attitude in Ottawa. Further, every man of any standing in Great Britain has now committed himself to the application of science to their industrial life. As you know, the British Government though slow to act are very thorough about things when they get going.

I think perhaps our little continued agitation centering around the Research Council has played its part also in creating public opinion in Canada. There is hardly a newspaper now but makes some reference to research work in its various forms. . . .

*The Hon. James Horace King, Minister of Soldiers' Civil Re-establishment, and Minister in Charge of and to Administer the Department of Health.—M.W.T.

TO THE HON. JAMES MALCOLM FROM H. M. TORY, EDMONTON, 29 AUG. 1927

In accordance with your request I have prepared, and enclose herewith for consideration, a memorandum covering the conference, between you, Mr. Stewart and myself on the question of establishing National Research Laboratories in Canada. I also enclose herewith a copy of a chart indicating how such laboratories could be organized and how they would fit in with the present activities of the Council.

I would be very grateful if you would bring this memorandum forward for consideration by the Governor in Council at the earliest opportunity.

You will, I am sure, appreciate the fact that certain proposals which have been made would necessitate private adjustments of such magnitude as to make it extremely desirable, from my point of view, that a definite decision should be reached at the earliest possible moment. . . .

TO H. M. TORY FROM THE HON. JAMES MALCOLM, OTTAWA, 1 SEPT. 1927

I submitted our report and suggestions to my colleagues yesterday and Council appointed a sub-committee to deal with the subject.

Mr. King felt that the sub-committee should include the Minister of Finance, who will be home shortly.

Regarding the immediate publication of a statement, Council did not feel that this was advisable nor did they feel that it was necessarily advisable to have too definite an undertaking before the Dominion Provincial Conference. Very privately I want to tell you these things, because they represent the views of the Prime Minister, who felt that should anything come up at the Dominion Provincial Conference that was worthy of consideration, it would be more difficult to remodel the plan if we presented it as the Government's definite intention. . . .

TO THE HON. JAMES MALCOLM FROM H. M. TORY, EDMONTON, 8 SEPT. 1927

I have your letter of September 1st. I was glad to know that you had made some substantial progress in the matter but on the other hand rather disappointed that no final decision had been reached upon the basis of which we could mature our plans. However, I know these things take time.

I have called a meeting of the Research Council in Ottawa on October

11th when I shall submit for approval in a general way the plan which I have already submitted to you. I expect there will be some discussion but of course it will be of a private nature and not necessarily of a kind to implicate you in any way. My hope was that I could present them with a fait accompli so that there would not be any special resolutions passed. . . . Perhaps, if it is decided not to take a definite programme to the Provincial Conference, you will not require me there. I should be glad to know your mind on that matter, as it may change somewhat my autumn plans. If you desire my attendance, I should like to discuss with you just how far I am to go. I could, of course, give a broad outline of the advantages which I consider a well organized research programme would give to Canada.

TO THE HON. JAMES MALCOLM FROM H. M. TORY, EDMONTON, 8 SEPT. 1927

. . . At the Imperial Conference, last year, it was decided to convene a conference for the purpose of studying inter-imperial agricultural problems. The meeting has been called under the Minister of Agriculture and Fisheries, in London. The various governments of the dominions have been asked to send representatives. To it all the Research Councils have been given an invitation by their own governments to send representatives with the exception of the Government of Canada. We were not even notified of the fact that the conference was being held. When the Department of Agriculture undertook to enquire about the agricultural researches going on in Canada, they enquired from every other source but the National Research Council and no request has come to us for information, although some of the largest researches in the world are being carried on under our National Research Council. New Zealand is sending two representatives to London, Australia and South Africa are also sending representatives from their National Research Councils. I frankly think we should be represented if for no other reason than to establish in the minds of the departments of government at Ottawa as well as the British Research Department the fact that there is a National Research Council in Canada doing work of the highest order. . . .

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 14 DEC. 1927

. . . Mr. Knapp called in the hope of seeing you, but in your absence unburdened himself to me. He now claims that he has established beyond question the theory of his principle and has done the thing which you

considered could not be done.* He stated in so many words that you are a fool and that the whole idea of placing research work under scientists and engineers or technically trained men of any kind is all wrong and that the Government is now going to listen to him because of the revolutionary importance of his new accomplishment, and he is going to see that there are no more Dr. Torys at the head of research in Canada . . . evidently his object in calling at this office was to tell you what an enormous blunder had been made by the Council in refusing his application. . . .

He also disclosed that he has adopted the slogan, "revenue without taxation," and that he has arranged for an interview with Mr. Robb tomorrow or next day and hopes also to see Mr. King and expects that they will give him a committee of Cabinet Ministers to develop his ideas in Canada. He also stated plainly that he intends when discussing matters with members of the Cabinet to do all in his power to discredit the Research Council in general and you in particular. . . .

In conclusion, I may say that Mr. Knapp also informed me during the course of our interview that he had had a talk with Winston Churchill and had promised to create revenue for the British Government without taxation and that he had been invited to go over and fulfill his promise. This he proposes to do in the immediate future. . . .

TO THE HON. JAMES ROBB FROM H. M. TORY, EDMONTON, 23 DEC. 1927

. . . In 1923, Mr. Knapp made an application for $10,000 to assist him in discovering "a means of applying the principle of the fulcrum and lever in electrical work and development." Later on he reduced this application to $2,000. I had a discussion with Mr. Knapp over the proposal, and was personally convinced that he had nothing new to offer. Most of the time he was with me he spent in denouncing the financial men who had prevented him from making a success of his roller boat. According to his way of thinking, the whole of the steamship interests and financial men of Canada were leagued against him. Before submitting the matter to the Research Council I wrote to Dr. H. M. MacKay, Dean of the Faculty of Applied Science, McGill University, and head of the Civil Engineering Department, for his opinion, as well as to Dr. J. C. McLennan. I am sending you their statements.

On the basis of these reports, the Research Council, not I, refused to make the grant. I, personally, got the impression that Mr. Knapp has an obsession. . . .

*Get more power out of a machine than you put into it.—M.W.T.

WHO SHOULD HEAD THE NATIONAL RESEARCH LABORATORIES?

TO HUME CRONYN FROM H. M. TORY, OTTAWA, 15 AUG. 1927

. . . I am to meet Mr. Malcolm and Mr. Stewart tonight and will be able to complete plans after they say definitely the extent to which they are prepared to go. They have asked me to submit in a general way plans for the development of research laboratories and the line of work to be undertaken. This I am doing in conformity with the resolution of the Research Council covering its future activities, as set forth in the Research Council Act and in the resolution of the Council passed shortly after I became President with reference to the scheme for its operation (See Proc. 61st Meeting, Minute 10 and Ex. D, p. 27). . . .

It is the intention of the Minister to submit the question to the Provincial Conference, which is being held early in November, in the hope that we may secure the co-operation of all the provinces in a general plan to avoid money waste. I am preparing a statement covering that, as well.

The question of whether I am to become permanently situated at Ottawa is being considered also. Would it be asking too much of you to give me your assurance that you would regard this as a wise move from the point of view of the Research Council. Please do not hesitate to be critical, as I have some doubt as to the wisdom of my resigning my present position to take up one here and therefore will not feel the slightest hurt if your judgment were adverse to my coming. . . .

TO H. M. TORY FROM HUME CRONYN, LONDON, ONT., 17 AUG. 1927

Replying to your letter of the 15th instant, I can whole-heartedly say that I think it would be to the immense advantage of the Research Council were you able to see your way to move to Ottawa and give your whole time to the activities of the Council. There is no doubt in my mind that to your efforts we owe the progress that has been made and the changed attitude towards the Council in official and departmental circles.

. . . In addition to the proposed move by Mr. Ferguson, I was told that the Conservative Convention in Winnipeg would go strongly on record in favor of the National Research Institute. It looks, therefore, as if political motives have played some part in spurring the Dominion

Government to action—not that I am inclined to quarrel with the motives so long as we can obtain the desired result! . . .

Will you permit me to add a further line on a subject not touched upon by you. Perhaps you will think I am rushing in where wiser men (even if not angels) would fear to tread, but, if I speak frankly, I do so with the confidence that you will not take offence, as my sole object is the welfare of the movement of which you are the mainspring.

If a National Research Institute is to be founded, the question will arise as to the Director in immediate charge of the work therein. Without hearing your views on the point, and with an admitted ignorance on the subject, it seems to me it would be a mistake to have the President of the Council in charge of the Institute. The President—with the Research Council—would undoubtedly have control of the policy of the Institute, but I have a somewhat strong conviction that the actual detail and day-to-day work should be entrusted to someone who would have no other calls upon his time. This would mean, I recognize, paying an additional annual sum for the salary of such a man, nor could this sum be a small one if we are to attract a capable Director. Even with this added burden upon the Institute (which for some years must be more or less of an experiment) I would still favor a division of the offices of "President of the Council" and "Director of the Institute."

Forgive me, won't you, for speaking as it were "out of turn." I do not know your mind on the subject, and your ideas may coincide with my own: I can only hope they do.

TO HUME CRONYN FROM H. M. TORY, OTTAWA, 24 AUG. 1927

. . . When I came to the Council three years ago, I found that the old Bill which had passed the House of Commons, but failed in the Senate, was still in possession of the field. I studied that Bill very carefully in the light of my own experience in administering machinery of similar character and came definitely to the conclusion that the separation of the Bill into two parts—(1) the Research Council with its own executive officers and (2) a completely separate organization, known as the Research Institute, under a separate set of officers—was a fundamental mistake and inquiry showed me that was the real reason why the Bill had failed to pass the Senate. I was convinced that no such separation was necessary for at least ten or fifteen years. Further inquiry showed that the hostility to the Research Institute organization was deep seated in the minds of members of the Government.

In the hope of securing legislation during my first year as President, I re-drafted the Bill as it now stands, a copy of which I am enclosing, centralizing the organization of the research laboratories directly under the Research Council, to be administered through the President. I put in a clause, however, which would have been clause 10 in the Bill, to the effect that there shall be a National Research Institute established at Ottawa, etc., and it was struck out specifically by the Prime Minister before the Bill was allowed to come to the House.

That Bill was submitted to the Council and after full discussion was approved and as such finally passed the House, due to the good offices of the Minister of Mines.* The passing of this Act gave the Council a much larger freedom with regard to the handling of its funds, but it left it still specifically in the position of an advisory board.

When I submitted the Act to the Council I also submitted a draft of what I conceived to be the method of administration which should be followed. At that time I pointed out one outstanding difference between the administration of "National Research Laboratories" (I am using this term with a purpose, as I do not think it wise to revive the old term "Institute," since it implies a separate organization†) and the laboratories of a specific industry, the difference being that in a specific industry, such as the Eastman Kodak Company, all the work done in the laboratory is done along an individual line. The same would be true of laboratories such as would be found in many of the larger industries of the United States. Here one person directing the laboratories and specially trained in the field of work occupied by that industry, was necessary. In the National Research Laboratories, however, no one individual could be found whose capacity would be at all comprehensive of the work being done and, therefore, instead of an individual director of research, we would need a group of men equal in status, who would be competent to direct research in special fields. These men together would form a group for the purpose of organizing research, but each responsible for carrying on work in his own division.

I am sending you for your private information today a copy of my latest draft of the way this proposal should work. You will please treat this letter and draft as confidential, because they have not yet been submitted to the Minister. I was asked to put down my thinking about the question in a formal proposal, of which the enclosed draft is an expres-

*The Hon. Charles Stewart, who had been Premier of Alberta while Dr. Tory was President of the University of Alberta.—M.W.T.

†This idea and this name of "National Research Laboratories" were suggested to Tory by F. E. Lathe.—M.W.T.

sion. My judgment is that no man can be found to be a laboratory director, who could possibly be put in a superior position with regard to research, to the heads of the divisions of research, as set out in the diagram. As a mere executive, straightening out tangles, he could without question function, but it is doubtful whether his function would include anything which could not easily, at least for the first five years, be included in the direct control of the President.

I recognize that this is a matter which will have to be fought out when the Council meets in October. . . .

I might add that we have had a meeting of certain members of the Committee of the Privy Council and I have given them as one condition of my coming to take over the organization of the Research Council and its laboratories the granting by Act of Parliament of a capital sum to be expended over a period of five years. The amount I have suggested for this sum is $3,000,000, with a current account of $350,000, increasing to $500,000 over the same period. Both the Minister of Trade and Commerce and the Minister of Mines have agreed to this and it is just possible that within the next two or three days I will get confirmation from the Government on the whole matter and get them to agree to a public statement. . . .

TO H. M. TORY FROM HUME CRONYN, LONDON, ONT., 26 AUG. 1927

. . . I have to confess that I rather took it for granted there would be a separate head of the National Research Laboratories—perhaps because I had before me the example of the Bureau of Standards, the Director of which held (if I remember aright) no position in the American Research Council.

You have, of course, devoted much more thought to the question than I have, and you are, besides, best fitted to form a considered judgment on it. You may, therefore, be sure that, although I cannot admit that I am as yet converted to your views, I shall at least keep an open mind on the subject.

TO H. M. TORY FROM A. B. MACALLUM, MONTREAL, 8 SEPT. 1927

. . . These laboratories, I take it, will constitute the beginning of the National Research Institute, to establish which the Research Council has striven since 1917. It is the case of hope deferred being near realization, and in that event it is very satisfactory.

I am, however, concerned with your statement that you will prepare

proposals for carrying out the will of the Council as expressed in the Research Council Act of 1924 and in the Resolution of the Council covering the general scheme of administration as per Proceedings of the Sixty-first Meeting of the Council. When that scheme of organization was adopted no Research Institute was immediately in sight and of course when I moved the adoption of that resolution I did not for a moment conceive that the scheme would cover the staff of a Research Institute. There is, of course, the heading "Directors of Research Departments Responsible for all Special Researches done under the Auspices of the Council," but this does *not* provide for the staff of the Institute the establishment of which has been the desire of the Council since 1917.

When, sometime before the last meeting of the Research Council, I heard on very reliable authority that the Minister of Trade and Commerce contemplated providing a vote of a very considerable sum to enable the Council to develop its aims, I informed three members of the Council, two of whom at once said that the matter should be discussed at the meeting so that the Council should be in a position to discuss what should be done and not be regarded as "a rubber stamp." At the suggestion of one of these I ventured at the close of the meeting to bring the matter forward for discussion. I did so, too incidentally perhaps, with an unfortunate result as indicated by the comments subsequently made.

Subsequently I hoped to have an opportunity for a private discussion with you. The failure of that hope prompts me now to write to you.

For five years the Council endeavoured to bring about the establishment of a Research Institute to be under a Director of outstanding attainments and achievements, who would give all his time to the work of the Institute in all its Departments, leaving the Administrative Chairman to deal with the management of the Council's affairs. In the Bill of 1921 provision was made for the establishment of the Institute, and a vote of $100,000 was placed in the Estimates to meet the initial expenditures for the same. There are members of the Council who were members then who still hope and are keen for the realization of that aim, in the situation predicated by the announcement of the Minister. I hope that realization will also be your object.

The Council must develop so as to meet the needs of the Dominion in a large way, as otherwise there will be a great deal of criticism of its aims and achievements. Recently in Toronto and here I have heard a great deal of such criticism of the Council, not from members but from business men, the gist of which was that the Council has been of com-

paratively little service to Canada and does not sense what is required. The announcement of the Minister was the occasion for this criticism. An example of what may be thus advanced is given in a copy (enclosed) of an Editorial in the Montreal Gazette of August 16th. . . .

(Editorial from the "Gazette," Montreal, Tuesday, August 16, 1927)

"SCIENTIFIC RESEARCH"

Greater activities by the state in the field of scientific research were foreshadowed during the last session of Parliament, and the Minister of Trade and Commerce now announces that a comprehensive plan is being developed, a plan which will cover all basic industries, including agriculture, forestry, fisheries, mining and the manufacture of the products of these industries. The task is engaging the attention of the National Research Council, under the direction of the Government, and the plan is to be ready for consideration by the conference of provincial premiers which will be held in Ottawa in November. It is proposed, apparently, to extend assistance to the provinces as well as to individual industries, such assistance to be based upon the special requirements of each province. The idea originated, officially, ten years ago, and has been blessed by the approval of some eminent parliamentarians. By others, it has been regarded with disfavour, chiefly upon the grounds of unnecessary expense. None the less, the Research Council has been at work for some years and has been credited with some notable successes, particularly in regard to the discoloration of canned lobsters. There was also, if we remember rightly, an announcement of importance respecting pink codfish, and there have been, it is said, some useful investigations in the reduction of complex ores in British Columbia. . . .

No one doubts or can dispute the value of the work done by the scientific experts of the Department of Agriculture in past years, particularly in the development of hardy and rapidly maturing wheats; nor can there be any question that the investigations carried on from year to year by the Department of Mines have been of real benefit in promoting one of the great natural industries of the Dominion. The successes won in these departments were the results of constant study by very capable and very enthusiastic officials who labored much and said little. There is a difference between this kind of investigation and that which the Government now have in contemplation. The appropriation for scientific research was slightly increased last session, but not enough to cause alarm; apparently, however, something very much more comprehensive, and

proportionately more expensive, is now being planned, and there may be some danger that Parliament, under the influence of the Government, will set up a large and costly machine, with ever-increasing personnel, and with ever-increasing activities, but without corresponding advantage to the people who will be called upon to pay the bills. . . .

Admitting that scientific research is desirable from the standpoint of industry, there remains good reason for caution in approaching an administrative enterprise which seems to promise the creation of a new and costly Department whose expenditure will increase from year to year, and having in its hands a formidable instrument.

TO A. B. MACALLUM FROM H. M. TORY, EDMONTON, 26 SEPT. 1927

I want to thank you for your letter of September 8th which came to hand a few days ago. As I read its content I have only to say that if it represents the views of any considerable number of the Council, then there has been a very grave misunderstanding, one so grave that it may jeopardize my further relation to the Council.

Let me recall to your mind the circumstances. When I came to the Council and after six months of work agreed to accept the Presidency of the Council, it was only after every other member of the Council had refused to consider the position and when the problem of whether it would not be wise for the whole Council to resign was under discussion. I took on the presidency of the Council at the risk of neglecting my other work and of injuring my own health because I felt that it would never do to allow the Council to become defunct; that, unsatisfactory as was its condition, I believed that with such influence as I could bring to bear upon the political situation I could do something to put the Council firmly upon its feet. You will remember that, when the question of appointing a technical expert to fill the vacancy due to the resignation of the former holder was before us not a single man presented himself who could have been of the slightest value in helping forward the work of the Research Council. That failure was the final reason which led me to take the presidency.

After a careful survey of the whole situation, I made up my mind that three things were required to be done:

(a) That we should do our utmost to remove prejudice and restore confidence in the minds of the government in the usefulness of the Council's work;

(b) That we should organize some really substantial researches that would attract public attention;

(c) That publicity work of a more intensive character would have to be carried on. . . .

Administration of the Laboratories

The heading that was written into the general scheme of administration as set forth in the minutes of the sixty-first meeting of the Council, viz., "directors of research departments responsible for all special researches done under the auspices of the Council," *does* provide definitely for the administration of the National Research Laboratories. If you will recall I made this statement to the Council at the time, viz., that National Research Laboratories could not be considered in exactly the same position as laboratories of individual industries where the problems were either associated mainly with one science together with certain mechanical engineering problems which would have to be solved, and that therefore no one individual could, by any stretch of imagination, be capable of giving direction to such a series of researches covering all phases of science as would naturally accrue in the Research Council's laboratories; that what was really wanted was a group of men capable of giving direction in special branches themselves jointly constituting under the president a committee for laboratory administration. There could be no question but the Council at that time understood my position. . . .

The Civil Service

Further, my first experiences at Ottawa showed me that I was surrounded by extreme hostility on the part of the Civil Service and I set myself to the task of restoring confidence in the motives of the Research Council. I need hardly say that in this I succeeded beyond my greatest expectations and today the Council has to a very large extent the goodwill of the Civil Service, the opposition no longer taking the form of studied attacks by approaching members of parliament.

Big, Useful Research Projects

As you know, when I took over the presidency we were not using more than one half of the money available for assisted researches because there were no applications for real researches coming into the Council and nobody was willing to set their minds to the task of finding the problems that had to be solved. Even the meetings of the associated committees were largely meetings for discussing academic questions. As the result of great personal effort a group of big researches is now under way; every one of these researches has been organized as the result of study

and persistent effort on my part to get them going. It is largely due to these big researches that Parliament has at last come to look upon the Research Council with a favorable eye, because the country members have become convinced that the money spent is being spent for a useful purpose. This current year we are spending nearly as much in carrying on assisted researches alone as we were spending on the whole work of the Council when I took over, three-and-one-half years ago. This is the real explanation of the present position of the Research Council.

Criticism

With regard to the criticism on the part of business men that the Council so far has been comparatively of little service to Canada, I can only say that the men who make that statement speak in ignorance of the facts and that it is not the generally accepted opinion. I have been in constant touch with large groups of business men for the last two or three years and they have always agreed that until laboratories were available for industrial research large enterprises could not be undertaken. I do not regard criticism such as you suggest as worthy of much consideration so long as the Council has its present record to hold up before the public. When the report of the Research Council was published, last year, there was hardly a first class newspaper in Canada that did not express wonder at the amount of work accomplished considering the size of the vote granted.

I saw the editorial in the Montreal Gazette, a copy of which you sent me. It only reflects what has always been the Gazette's position ever since Senator White opposed the Research Council in the Senate [in 1921]. I might add that I have had sent to me through the Clipping Bureau at least one hundred editorials and the only one that uttered a critical word was the Montreal Gazette. All the others expressed themselves as entirely in sympathy with the movement and expressed goodwill towards it.

Publicity

With regard to the question of publicity: I think I need hardly refer to the efforts that I have put into this. I know that some of you regarded me as preaching too much but I have been too long before the public not to have some judgment as to the manner in which you can get the public's attention. During the last three years, I have spoken on scores of occasions at points where extensive publicity was given to my statements. To do this has taxed my strength to the limit almost of endurance but I have done this because I believed it the only way to get people to listen. I have carried on from my own office and from the office of the

Research Council an extensive correspondence with all sorts of people to create public interest. That I have succeeded so well considering the multiplicity of my duties has been a matter of surprise to myself.

Laboratories Directly under the President

Now, the point I am coming to really is this: that if I sensed aright the statement made by you and others at the close of the last meeting of the Council the proper inference to draw is that now that the Council has reached a stage where it can hope to go forward on a large scale, you are once again turning your attention to the type of highly paid official that was suggested when the idea of the Research Institute as a separate organization was considered. So far as I am concerned, I am wholly opposed to any plan which will separate the National Research Laboratories in a separate organization. The proper way for such laboratories to function is directly under the President of the Research Council with a group of directors as distinct from a single director controlling its operations. I am making this statement to you in confidence because I see now that we are back again upon our feet I am likely to be faced with opposition to plans that it has taken years of hard work to materialize. You and others, I fear, have clearly forgotten the discussion which took place at the 61st meeting of the Council when the future plan of the research organization was approved and along the lines of which I have been acting ever since.

TO HUME CRONYN FROM H. M. TORY, EDMONTON, 26 SEPT. 1927

. . . I thought you might be interested in knowing the additional steps taken since I wrote to you. The matter was submitted to [the Privy] Council and a new committee on Industrial Research was appointed to discuss the matter further. The committee consists of: Hon. James Malcolm, Chairman; Hon. J. A. Robb; Hon. C. A. Dunning; Hon. Lucien Cannon: Hon. P. J. A. Cardin; Hon. W. D. Euler; Hon. Charles Stewart. . . .

. . . the Bureau of Standards of the United States was founded long before the National Research Council and does not associate itself in any way with the activities of the Research Council of the United States. The same statement applies to the Mellon Institute, which, as you know, is a private institution now associated with the University of Pittsburgh and having its own board of management. It also was founded long before the National Research Council was called into existence and has never had any relation whatever to the National Research Council. The

result is the National Research Council of the United States is not making any effort to control the laboratories at all. It is not a department of the government in any sense. It was endowed to the extent of five million dollars by the Rockefeller Foundation and devotes its attention entirely to promoting scientific effort in a general way and not through specific laboratory agencies. Because nothing corresponding to the Bureau of Standards existed in Canada our Research Council will be in a unique position of having in its possession a laboratory system the relation of which to the Research Council and its president will be almost identical with the relation which a university has to the university board of governors and the president of the university. If we are able to combine the features of the Mellon Institute and the Bureau of Standards in National Research Laboratories, we will have secured a piece of unified effort on a finer scale than is done anywhere else, so far as I know. It is for this unification that I have been striving. The best analogy that I know is the analogy of the Massachusetts Institute of Technology where the President of the Institute is the Director of all the Institute's activities, having under him a group of deans corresponding to the persons that I have mentioned as directors of research through whom he operates the institute.

TELEGRAM TO F. E. LATHE FROM H. M. TORY, EDMONTON, 2 NOV. 1927

Complete organization chart. Make one square for Privy Council Committee including Minister as Chairman, similarly for Research Council including President as Chief Executive Officer. Make additional square for Director of Laboratories *for time being** the President of Council or equivalent words.

TO H. M. TORY FROM A. L. CLARK, KINGSTON, 10 NOV. 1927

I had a telephone call from Dr. Skelton's office this morning and the question was asked as to whether the Research Council were in complete agreement over the establishment of research laboratories in Ottawa. My reply was that the Council was unanimous and that there was no disagreement. I have since written a letter to Skelton, a copy of which I enclose.

*Italics mine.—M.W.T.

TO O. D. SKELTON* FROM A. L. CLARK, KINGSTON, 10 NOV. 1927

I told Miss MacKenzie this morning, in reply to her question that the vote in the National Research Council in regard to the research laboratories in Ottawa was unanimous.

There had been some difference of opinion over the exact organization of such a laboratory system, but there was no divergence of view whatever on the necessity for such a system for Canada. For example there was some difference of opinion on the question of a director. Some thought that the director should be appointed at once. Dr. Tory, who had the matter very carefully thought out, presented his view that, for the present, the laboratories should be operated under the immediate supervision of the Council, through the president, and, after discussion, it was agreed to adopt his view. You know perfectly well the make-up of the Council and also how difficult it is to get complete unanimity in such a group where, to some extent, personal feelings come out. I think that it was a real triumph for Dr. Tory when he was able to persuade them all to adopt his point of view which, I think, is quite sound. . . .

TO A. L. CLARK FROM H. M. TORY, EDMONTON, 17 NOV. 1927

I have your letter of November 10th and also a copy of your letter to Dr. Skelton.

It is rather curious that the inquiry was made the very morning that I made my statement to the Provincial Conference. It might interest you to know that there was some difficulty in getting a chance to speak, even after I had been invited to Ottawa by the Minister himself. Some of the criticism that emanated from members of the Council had evidently reached circles of which even I was not aware. I am not sure that we are yet out of the woods. The divided councils at Ottawa may mean definite action elsewhere. There are those who, while professing profound friendship for the Research Council, are doing their utmost to back other organizations.

I am grateful to you for your reply to Skelton.

TO A. B. MACALLUM FROM H. M. TORY, EDMONTON, 19 NOV. 1927

. . . I have searched the old minutes to determine just what really did take place when we prepared the Bill which was afterwards passed by

*Dr. O. D. Skelton, Under-Secretary of State for Foreign Affairs, 1925 to 1941.—M.W.T.

the House of Commons. I find the whole thing set out in Item 21 of the minutes of the fifty-sixth meeting of the Council. The minute reads as follows:

The Council had under consideration the revised Research Council Act, as drafted by the Chairman, who explained that the revised Act does not differ in any material way from the previous Act, Bill 116, 1921, except that section 15 of Bill 116 has been omitted and that provision is made in the revised Act for the administration of the National Research Institute and the Research Council under one executive organization under the Research Council, the President of the latter body being the executive head of the combined organization. After careful consideration, it was moved by Dr. McLennan, seconded by Sir George Garneau and resolved that the revised draft of the proposed legislation to amend the Research Council Act and to Establish a National Research Institute be approved.

On the strength of this minute, I prepared the diagram which was presented at the sixty-first meeting. If you will look at the minutes of the fifty-ninth and sixtieth meetings, you will see that the matter was making progress and was not finished until the sixty-first meeting. This minute certainly shows that there was no misunderstanding at the time as to what was being done. The drafted Bill was submitted, and every clause in it approved. Naturally, I remembered the transaction more intimately than did other members of the Council, because I have been working steadily in connection with their resolutions. It is surely a complete answer to the hint made that my negotiations had not always been in accord with Council resolutions. It also answers completely the statement that the research laboratories were not to be considered as an integral part of the Research Council's work.

I would especially call your attention to the fact that the resolution connected with the first minute was moved by McLennan, and that the resolution in connection with the diagram of responsibility, passed on Minute 21, was moved by you.

TO HUME CRONYN FROM H. M. TORY, EDMONTON, 19 NOV. 1927

. . . I have looked up the old minutes to find out exactly what was recorded and how far my memory was in harmony with the record. . . .

It was in harmony with this decision that I have been acting ever since, and I confess I was completely taken by surprise by the statements made by Macallum and McLennan at the last meeting. . . .

Please forgive me referring to this in this way, but it is the first time in my life that it has ever been suggested to me that I had not been acting in a straightforward manner and, naturally, I was not feeling very happy over it. . . .

TO H. M. TORY FROM HUME CRONYN, LONDON, ONT., 25 NOV. 1927

. . . I feel impelled to answer your letter—the more so as I leave to-day for some weeks' absence, and would be unhappy did I not try to dispel any idea in your mind on the question of "straightforwardness". . . .

Since the meeting I have had one or two talks with Dr. McLennan, who made no mention of anything of the kind: indeed, the impression left on my mind as a result of the meeting was that you had won your point with surprisingly little opposition or criticism.

Do not think me impertinent if I urge you to banish from your mind any feeling over a difference in policy: I am perhaps more fully aware than you can be—of the high regard in which you are held by the members of the Council, and the great value they place upon your efforts on behalf of Scientific Research. Just as these efforts are about to be crowned with success, it would be a tragedy were you to feel the Council were not wholeheartedly behind you. . . .

TO H. M. TORY FROM SIR GEORGE GARNEAU, QUEBEC, 26 NOV. 1927

. . . With reference to the diagram that you submitted to the last meeting of the Council, the objection raised was more or less of the nature of a tempest in a tea pot, and the majority of the meeting was clearly in your favour. The slight amendment* made to the diagram provided a way out of the difficulty which arose and—in my estimation—made no substantial alteration to the scheme outlined by you. I am convinced that time will show that your view is correct as to the necessity of full control of the Research Laboratories remaining in the hands of the President of the Council. Otherwise, the Council will inevitably in time become a dead letter.

TO FRANK ADAMS FROM H. M. TORY, EDMONTON, 5 DEC. 1927

. . . Clark writes me that it is quite clear that certain Ministers are exceedingly anxious to know how far criticism has gone. The truth is that Macallum talked to R. B. Bennett and told him the Council was not behind me and R. B. went to the Minister about it. If he talked to R. B., he doubtless talked to many others. It would be a strange irony of fate if . . . , having by his tongue jeopardized the whole project five years ago, [he] should again jeopardize it when it might get upon its feet. . . .

*". . . a Director, who shall *for the present* be the President of the Council."—M.W.T.

TO A. S. MACKENZIE FROM H. M. TORY, EDMONTON, 7 DEC. 1927

. . . I happen to know that McLennan has been backing Ferguson. I suppose you saw the statement made the other day by Ferguson. I had a letter from him written a day or two before he made his recent address in which he acknowledged receipt of the address I gave at Ottawa and stated that he intended to say something public but that he wanted to see me before any action was taken. I am assuming that his speech was really intended to put him in the limelight on the question but that he wishes to discuss with me in what way they can co-operate. The truth is the underhand talking that has been going on has jeopardized our plan. I am awaiting now a call to Ottawa to see the Minister over the whole matter again. In the meantime, he has given me instructions to prepare the plans for a building. I am not doing very much other than to work out something in the way of space on which I can estimate the cubic content cost. . . .

TO H. M. TORY FROM J. C. MCLENNAN, TORONTO, 8 DEC. 1927

. . . When I moved the motion you refer to, at the Fifty-Sixth meeting of the Council, I did not grasp that Executive Head meant immediate Directorship of the Laboratory. That never occurred to me. I think the Council and its Chairman should be above all that. In fact it should be so much above it that, as time goes on, all the other scientific departments of the Government would naturally and practically automatically come under the jurisdiction of the Council. With you as Chairman and President of the Council, and a policy like that put forward I can see nothing but success ahead, but with a President of the Council acting practically as Director of the Laboratory, I see a possibility of trouble at once arising for the Council, possibly from the Directors of other Departments of Government not under the Council. Why for example, they might say, should the Director of the Research Institute have a Council to support its policy, and the other Departments not have one? The Council's chief function and that of its President should in my opinion, be to give advice to the Government. With that as its main duty I think we ought to keep always in mind the view that the Research Institute, with its Director or Directors was but one of a number of similar, or allied organizations.

The projected Laboratory or Laboratories and their Directors could function well under a good Council, and other Departments or Bureaus

would, I should hope, ultimately come under the Council too. We might even expect to gather finally all the Scientific Service under it. But it would be an anomaly to have our President of the Council the Director of either one or all of them. I believe you would be at your best functioning as President of a Council trying to bring about such a consolidation of all these Bureaus, Laboratories, Associated Boards and Committees, and endeavouring to have the scientific method intensively adopted by all. . . .

TO J. C. MCLENNAN FROM H. M. TORY, EDMONTON, 19 DEC. 1927

. . . I never thought of you as having talked outside, but, as a matter of fact, a member of the Council talked to a prominent member of the opposition—a very prominent member, indeed—who thought it important enough to communicate it directly to the Minister of Trade and Commerce, stating that the Council was not in harmony with what I was doing even before the plan that I was submitting had been submitted at all, which indicated disloyalty within the organization. It was that that made me angry. You will never know how close we came to having the whole matter taken out of our hands and if anything were done it would have been done under a Government department. I think we have escaped from that. . . .

TO H. M. TORY FROM A. B. MACALLUM, MONTREAL, 22 DEC. 1927

. . . When the Act of 1924, in Bill form, was considered by the Council no member except yourself, it now appears, considered for one moment that it implied, so far as the hoped-for Institute was concerned, that the control of it would be in the slightest degree different in character or scope from what was postulated in the Bill of 1921. The Institute, as that Bill provided, would be completely under the control of the Council; all the appointments to its Staff, including the Director, were to be made by the Council, and on terms to be determined by the Council absolutely. The Institute was not to be separate and independent of the Council—the executive control of it was to be in the Council, of which the Administrative Chairman was to be the Executive Head, carrying out the orders involved in the decisions of the Council. Not one member of the Council who gave full thought to the subject of the Bill when it was considered held that it implied that the President of the Council would be the Director of the Institute. That is why a number of members at the last

meeting "reacted" as they did. They think, as I also think, that the President of the Council will have enough to do if he gives *his whole time* to the administration of the Council's affairs, without being taxed with the technical supervision of all the researches undertaken by the Institute.

There is a critical time ahead for the Council—of that I have had very recently some very disquieting reminders—and, in consequence, I believe the Council must now act so as to win for its projected Institute a large amount of the support necessary for it to succeed. We could win that support by having as its Director an outstanding man like the late Dr. Robert Kennedy Duncan, a Canadian, who brought about the establishment of the Mellon Institute. There are men, not very many, who would pass muster for such a position.

In writing this I know that I am making statements which are not acceptable to you, or which may not read pleasantly. However, I could not do otherwise for I must be frank with you and honest to myself. . . .

TO A. B. MACALLUM FROM H. M. TORY, EDMONTON, 30 DEC. 1927

. . . 1st. When the matter was discussed, I made it perfectly clear that instead of having one director there were to be departmental directors; that an individual director could not possibly be more than an executive head. I definitely proposed that there should be at least four men of a quality equal to the person originally designed to be the director.

2nd. You say that this was not understood by any member of the Council except myself. I beg to say that there are at least four members of the Council who definitely remember the whole discussion and agree with my statement regarding it. The discussion was based on the hope at that time that I would give my whole time to the general direction of the Council. The truth is that the rest of you, having had the old organization in your minds, have forgotten the discussion which took place. At that time you will recall many of the members were talking of resigning altogether from the Council and I think I had something personally to do with creating the atmosphere that made them say, "we will keep on." I have only to add that my personal relation to it need not in any sense be a factor. I took the task on to save the Council at a time when not another member of the Council would agree to take the chairmanship. Out of that condition of affairs I have brought something like order and stability and, through the organization, a number of what are really great researches. I am willing at any time to hand over the Council to any one whom the Council thinks is more competent. To tell the truth I am rather

tired of controversy and agitation. I think my experience in the organization and development of scientific work in Canada, both in Alberta and in the Research Council is sufficient warrant for the confidence I had in recommending the manner in which the work should be done. I think I am justified in saying that no other man in Canada has had quite the range of experience in creating the machinery for scientific work that I have had.

RELATIONS WITH GOVERNMENT DEPARTMENTS

TO F. E. LATHE FROM CHARLES CAMSELL, OTTAWA, 1 FEB. 1927

With reference to your request of the 21st ultimo that Mr. A. F. Gill be transferred from the staff of the Mines Department to that of the Research Council we can spare Mr. Gill only if we can get a substitute to carry on his work with us. We naturally do not desire to stand in the way of his advancement but we cannot afford to sacrifice our work. I find that it took three months to secure Mr. Gill's appointment from the time application was first made to the Civil Service Commission. . . .

I think it would be well to draw the President's attention to the situation as an illustration of what may happen if the Research Council is to set up laboratories for research work along similar lines to researches conducted by the Mines Branch or indeed any other regular Government branch. The difficulties under which the Mines Branch now operates with respect to technical appointments and lack of laboratory space will be greatly increased if laboratories for a similar kind of work are set up under the Research Council and a policy is developed of selecting men from our laboratories at higher salaries than we are permitted to pay. This would force upon us the onus of going through the present procedure required by the Civil Service Commission in selecting our employees—a procedure which requires from two to five months—only to find that we are acting as a recruiting and training organization for the benefit of the Research Council.

For these reasons I think it highly desirable that the scale of salaries paid to technical men by the Research Council should not differ much from those paid by the Government, especially when the Research Council carries on similar investigations to those undertaken by the Government. It would be much better that in fields of technical work already

occupied by Government branches such as that of the Mines Branch, that field should be left to the Mines Branch, and the Research Council use its influence to support the Department's case for equipment and technical help.

I think the whole question of the Council's relationship to technical Government departments should be fully discussed and a policy laid down of cooperation and coordination that will tend to improve that relationship and do away with the possibility of misunderstanding.

TO CHARLES CAMSELL FROM F. E. LATHE, OTTAWA, 4 FEB. 1927

. . . In the minutes of the fourth meeting of the Associate Committee on Magnesite, section 8, I find the following entry: "The Committee thought that it would be desirable to secure the services of Mr. Gill of the Fuel Testing Laboratory to carry on this research if laboratory facilities were secured and provided that the Department of Mines was willing to release him. Dr. Camsell expressed the opinion that there would be no difficulty about this." Again in the minutes of the fifth meeting, section 17, there is the statement: "Dr. Camsell stated that he would be willing to release Mr. Gill as soon as a successor could be obtained" . . .

You will recall that in the case of our Magnesite investigation officials of the cooperating magnesite companies first approached you as Deputy Minister of Mines and asked for assistance. We undertook the investigation with the understanding that your Department did not wish to take any action. When this question was first brought before the Council at its meeting in March 1925 a Committee was appointed to consider the question, and we felt that the inclusion of your name in the personnel of that Committee would ensure that if any action was proposed which appeared to duplicate the work of your Department this fact would immediately be pointed out, and the Committee modify its plans accordingly. Practically all of the work of this Committee has, up to the present, been carried out in the laboratories of the Mines Branch with the hearty cooperation of the members of your staff. We greatly appreciate the opportunity which has thus been afforded us to prosecute this investigation, and we have no intention of taking any steps which might interfere with our present cordial relations.

Regarding the general policy of the National Research Council I am glad to adopt your suggestion and to place this matter before Dr. Tory. He has so often expressed his wish to cooperate fully with every department of the Government and his desire to avoid all duplication of effort,

and your own attitude towards the National Research Council has been so generous that I am sure there will be no difficulty in laying down a policy which will be satisfactory to both branches of the Government.

TO H. M. TORY FROM F. E. LATHE, OTTAWA, 4 FEB. 1927

. . . It is my impression that his present letter reflects the opinion of members of his staff rather than any feeling of his own that we have at all encroached upon the work of his Department. . . .

I would rather abandon the proposed investigation of hydro-magnesite than, by acting too quickly at the present time, run the risk of antagonizing Dr. Camsell, or giving just cause of complaint to members of his staff. I may say for your information that my relations with Messrs. McLeish and Timm continue as cordial as in the past. It has come to my knowledge, however, that this general question of policy of the National Research Council has been discussed by members of the Mines Branch in terms similar to those stated in Dr. Camsell's letter.

TO F. E. LATHE FROM CHARLES CAMSELL, OTTAWA, 25 FEB. 1927

. . . The Department far from not wishing to take any action with respect to the magnesite investigation was very anxious to do so; but owing to lack of laboratory facilities, money and men, and the difficulty of securing these, we were unable to undertake it. The Research Council then undertook it and we provided what help we could. I am, however, still strongly of the opinion that investigations of this kind should be handled by the Mines Department and that the Research Council should give its backing towards securing from the Government the necessary assistance to carry them out.

TO F. E. LATHE FROM H. M. TORY, EDMONTON, 1 MARCH 1927

. . . I am very sorry indeed about what has happened in connection with Gill. Dr. Camsell's letter does not cover the whole question at all. When we originally discussed going on with the work his statement to me was that they had not the money to carry on the outside investigation and as this was work of a more or less commercial character it was contrary to the Minister's wishes that it should be carried on by them. They had the first chance to start and did not do it but do not write or say anything that would make the opposition more difficult. I will see Camsell myself when I go down.

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 14 APRIL 1927

Re: Tuberculosis Committee

. . . If it was the practice or had been the intention to publish the Proceedings or reports presented at the forthcoming meeting, it might be possible to understand the attitude of the Department of Agriculture on this question. Since Dr. Grisdale must have clearly understood . . . that this was neither our practice nor our intention, I am absolutely at a loss to understand just in what way he considers his Department is co-operating in this work.

It would appear obvious that this is but another of many examples which we have encountered where the departmental idea of co-operation is that the co-operation should all be on the part of the Research Council and that while they are quite willing for us to undertake difficult or unpromising problems, if any material progress is made with them, should then be turned over to some Department to develop and exploit to their own credit. In other words, that the Department should take the cream and the Research Council should exist on a diet of skim milk. Under such an arrangement, invariably when a department makes a success of work initiated by the Council, it takes all the credit to itself, but if the work does not come up to the original expectations, as in the case of the lignite work, the Department drops out of the picture and the Research Council is permitted to assume the blame.

You will note, however, that Mr. Malcolm promised in the House last night, in reply to a question raised by Mr. Bennett, that any plan which may be brought down at the next session of Parliament providing for research laboratories will have regard to co-operation between all Government technical services.

TO S. P. EAGLESON FROM H. M. TORY, EDMONTON, 20 APRIL 1927

I have your letter of April 14th with a copy of the communication from Dr. Grisdale on the subject of Tuberculosis. I think there are two explanations of the action taken:

1. Watson* has nothing to communicate; his department has been bluffing all along as to what he is doing. For example, Grisdale has not hesitated to give full reports to the Rust Committee of the work of his department because there they are doing something substantial.

*Mr. E. A. Watson, Chief Animal Pathologist, Department of Agriculture. —M.W.T.

2. It is possible Watson and Hilton* do not want to make a report as they are openly antagonistic to what is going on. In any case, I shall write Dr. Grisdale a letter about it.

TO H. M. TORY FROM J. H. GRISDALE, OTTAWA, 26 APRIL 1927

. . . Any report which is published must come out under the name of this Department, as this is only part of our work, yet to take it out of the work of the Department would make the remainder appear incomplete, and to publish the same matter twice would also be objectionable. Consequently, it will be in order for Dr. Watson to submit an interim report on his work up to the present time on the distinct understanding that such report is not for publication.

TO H. M. TORY FROM CHARLES CAMSELL, OTTAWA, 8 APRIL 1927

. . . I have since learned [since a meeting of the Council] . . . the action that was taken with respect to lithium, magnesite, and the insulation committee. I learn also that recommendations were made to the Minister to re-elect the five members of the Council whose terms had expired.

In discussing the last point with Mr. Stewart† the question of Mr. Cory's‡ appointment came up and he asked me to communicate with you to get your views. I have known for some time that he wanted a seat on the Council, but I have known also that there has been some lack of sympathy between Mr. Cory and some members of the Council which would not be conducive to the smooth working of the Council. I do not think Mr. Cory himself would participate very much, if at all, in the discussions of the Council but his presence there would I think remove a source of strong opposition and bring that influence behind the Council. For political reasons alone I think his appointment would be worth considering.

As you know, Mr. Mallory of the Interior Department is on our Insulation Committee. His appointment was made in the usual way, but apparently that way has caused some irritation to Mr. Cory. I would like such feelings removed and if we could get Mr. Cory behind the Council I think it would be to our advantage.

*Dr. G. Hilton, Veterinary Director General, Department of Agriculture. —M.W.T.

†The Hon. Charles Stewart was Minister of the Interior as well as Minister of Mines.—M.W.T.

‡Deputy Minister of the Interior.—M.W.T.

It is possible you may see Mr. Stewart in the west before your reply to me can be communicated to him, but in any case I would like to have your views as soon as possible.

TO CHARLES CAMSELL FROM H. M. TORY, EDMONTON, 14 APRIL 1927

. . . With regard to Mr. Cory I have thought a great deal about the matter and frankly do not think that Mr. Cory has any contribution to make to the Research Council unless he is prepared to change his mood. His expressions of good will to me personally were very kind but the advice that he gave to members of his department not to give us information, not to mention us in their literature, etc. does not indicate that he would come to the Council with an unprejudiced mind. However, I propose, when I go down, meeting Mr. Cory and thrashing the matter out with him, unless Mr. Stewart tells me not to.

With respect to Mr. Mallory's appointment on our Insulation Committee, we asked Mr. Lynch, his superior officer, if he would permit him to serve and he assured us that he would so we are not to blame, but the fact that the question of his cooperation could be raised itself is indication. I might add further that if there is to be an extension of the Research Council's machinery and I understand that is practically now decided upon by the Government, then I think the whole question of reorganization of the Research Council has to be brought under review. This statement of course is especially private. I am confident, however, that changes will have to be made that will open the door to Mr. Cory's appointment, should it be deemed wise. It is for this reason that I was quite content to allow the five retiring members to all be reappointed.

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 5 MAY 1927

. . . About the time that our estimates were passed, Mr. Malcolm sent for me and inquired whether we had any information on the seasoning of lumber. . . . He was under the impression that the Forest Products Laboratories were operating under this Council, but I informed him that at the present time they were under the Forestry Division of the Interior Department . . . and he asked me whether I could find out for him just what information was available from that source. . . .

When the matter had been explained to Mr. Finlayson,* I found that

*Mr. E. H. Finlayson, Director, Forestry Branch, Department of the Interior.—M.W.T.

I was up against the same suspicious attitude which we have so frequently experienced. He immediately suggested that he could take this question up with Mr. Malcolm direct. . . . I thought that under the circumstances the best thing to do was to place the facts frankly before Mr. Malcolm. . . . I informed him that Mr. Finlayson was anxious to take the matter up with him personally and I also told him that there was some truth in the statements made in the House the night before by Mr. Bennett regarding lack of co-operation in Government departments and that we were frequently confronted with this difficulty. He replied to the effect that he was fully aware of this fact and informed me that he and Mr. Stewart intended to get all of those in responsible charge of Government technical work together on this very question in connection with the proposal to go forward in a constructive way with the work of the Research Council. . . .

TO A. L. CLARK FROM S. P. EAGLESON, OTTAWA, 8 JUNE 1927

. . . practically every Department of the Federal Government is ready to co-operate with us, provided we do all the co-operating. . . . personally I have many times felt that some of the Departments were more concerned with preventing encroachment on what they consider to be their preserves than with the importance of getting the work done. This situation is thoroughly recognized by those who have had any considerable experience with the Public Service and, as a matter of fact, it was the subject of several speeches in the House of Commons at the last Session of Parliament, especially by the Hon. Mr. Bennett. . . .

With respect to the particular work in question, it is perhaps only fair to point out that the Research Council is not in any way contributing financially to the tuberculosis work carried on by the Federal department of Agriculture. Nevertheless, this group of workers has accepted membership in our Associate Committee and professes to be working in close co-operation with it. . . . I wrote to them, as to the other groups, requesting them to come to the meeting [of the committee] prepared to present a report and received in reply from Dr. Grisdale, the Vice-Chairman of the Committee, the astounding information that as this work was financed by the Department, he could not permit his officers to report to the Committee. It was only when Dr. Tory wrote to him personally pointing out that the reports presented to the Committee were desired for the information of all the workers and would not be published that he finally agreed to have his group present a report. . . .

RELATIONS WITH INDUSTRY

TO H. M. TORY FROM F. E. LATHE, OTTAWA, 2 MARCH 1927

. . . Mr. Westman* appears to be fairly familiar with the woollen industry. . . . He says that while some of the mills are quite up to date there are others which are almost hopelessly behind the times. The mills pursue a policy of secrecy and according to him have greater need of some textile expert to run their mills for them than to have any research work done. . . .

I explained to them the general organization of the Council and the function of Associate Committees and assured them that you were anxious to help the woollen industry as much as possible. They inquired regarding possible financial arrangements and I said that I would prefer them to discuss that question with you. I said at the same time that I believed it would be your wish that in any large investigations the industry should bear a reasonable part of the expense. From the effect which this produced I believe that they had been expecting us to foot the bill for all expenses incurred, although they still appeared to be anxious to go ahead and make plans for the work. . . .

There was almost as much hesitation in naming the mills which I might visit as in suggesting members of the Committee. They pointed out that there was a great deal of secrecy in the industry and it was only when I assured them that I was too ignorant of the textile industry to carry away any trade secrets and that as a Government employee I would regard all information received as confidential that they finally left to their secretary the naming of the mills. I do not anticipate any further difficulty here but possibly they may hesitate to show me everything and tell me all of their problems as I would like them to do. . . .

TO E. E. FIRTH (SECRETARY, DOMINION WOOL DEALERS' ASSOCIATION) FROM H. M. TORY, EDMONTON, 13 SEPT. 1927

. . . For several years the Canadian Woollen and Knit Goods Manufacturers' Association has been anxious to have the National Research Council investigate the problems of the wool industry, from the growing of the wool to the final processes of manufacture, but on account of our limited facilities we were for long unable to comply with the request. Last spring, it appeared that the time had arrived when something might

*Mr. L. E. Westman was editor of the *Canadian Chemical Journal*, Toronto.—M.W.T.

be done, and as a preliminary step I called in Toronto a conference of wool growers and manufacturers as well as certain Dominion and Provincial Government experts. . . . the outstanding fact revealed was the failure of Canadian wool growers to raise in sufficient quantities those grades of wool required by our home market, and the inability of the manufacturers to state the quantities and qualities of wool which they could normally use. The conclusion was inevitable that the first step to be taken, before any general plan of action could be outlined, was to secure detailed statistics regarding the production, consumption, imports, and exports of wool of each grade. . . .

We realize that it means a considerable amount of work, but we believe that it can be done more readily and accurately by your Association than by any one else, and we feel that the issues involved are such as to more than justify the expenditure of the necessary time and energy. . . .

TO F. E. LATHE FROM DAVID C. DICK (TEXTILE & DYERS CORPORATION LIMITED), COBOURG, 24 OCT. 1927

It has occurred to me that in your investigation into the wool situation it might be of some service to you to have some practical facilities at your disposal. If so I will be only too pleased to place the facilities of any of our three factories at your disposal for practical tests or for experiment such as they are able to carry out on any of their sample machinery or their laboratories. . . .

RELATIONS WITH PROVINCIAL GOVERNMENTS

TO THE HON. HOWARD FERGUSON FROM H. M. TORY, OTTAWA, 21 NOV. 1927

I am forwarding you, as promised, a copy of the remarks I made at the Premiers' Conference. I spoke to Mr. Malcolm about it afterwards, and he told me to send a copy to you. I hope you will find time to go over it carefully, especially the parts in which I refer to educational matters, because I suspect that you did not quite understand until the Conference exactly the plan that was in my mind. Let me say that I never had any intention of bringing students to Ottawa to carry on researches. We are to continue doing that at the Universities as heretofore. The men brought to Ottawa would be research graduates who are

able to carry on work of their own, and who would be put on a permanent staff. The greatest work of such a staff would be the work of standardizing materials, and of studying possible improvements in manufacturing methods. If an individual manufacturer, or a manufacturing organization wished to have work done of a private character, based on their own ideas, they would have the privilege, as in the Mellon Institute and also in the Bureau of Standards, of sending a man, either selected by the Council or by themselves, to do their work, in which case, of course, the information would be private information, the cost being borne by them.

. . . I would like very much if you could go over the whole matter with me again before you take any further action with regard to plans in Ontario. . . .

TO H. M. TORY FROM THE HON. HOWARD FERGUSON, TORONTO, 28 NOV. 1927

Please accept my thanks for yours of the 21st inst. together with the memorandum which you were good enough to send me.

I note that you are to be here some time about the New Year. I will refrain from any further movement along the line I had in my own mind. It may be, however, that I will discuss the question of research in a very general way at a meeting of the Manufacturers' Association that I am to attend next week.

I hope when you come you will give me the opportunity of going into the matter a little more fully with you.

TO S. P. EAGLESON FROM H. M. TORY, EDMONTON, 3 DEC. 1927

. . . I see that Ferguson has made a public statement of his intentions. I suppose that means additional difficulty. If it were not for you and Lathe I would feel like pulling out of the whole thing.

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 9 DEC. 1927

I enclose herewith a clipping from the Toronto Mail and Empire giving a rather full account of Premier Ferguson's statement before the Canadian Manufacturers' Association on the question of scientific research. I do not know of anything new in this, except perhaps the definite statement which he is reported to have made to the manufacturers —"I promise you now that unless we get some satisfactory action as the result of the Tory report, a year hence the Province of Ontario will be doing

something very actively for you." It is evident that Mr. Ferguson has gone too far to back down, even if he wished to do so, and it is equally evident that the Federal Government are to have just one more chance to take adequate action at the forthcoming session. Otherwise, the Province of Ontario will go ahead on a big scale with a provincial scheme for scientific research. Possibly this very fact will do much to strengthen Mr. Malcolm's hand, but in any event after spending eleven years, more or less, in the wilderness, it will be a source of satisfaction to have the matter settled definitely one way or the other. . . .

TO THE HON. JAMES MALCOLM FROM H. M. TORY, EDMONTON, 31 DEC. 1927

. . . As arranged with you, I sent copies of my statement at the Prime Ministers' Conference to all the Prime Ministers, marked "confidential". I do not know whether you noticed that our good friend, Howard Ferguson, although carefully avoiding mentioning my statement, really used it as the basis of his speech to the Canadian Manufacturers' Association. It goes to show how difficult it is to have anything treated as confidential when it passes into the hands of persons who find it to their advantage to use it. I suspect his Toronto speech was entirely made for political purposes in the hope that at least a share of the credit for the forward movement which you proposed might come to him. . . .

TO SIR GEORGE GARNEAU FROM H. M. TORY, OTTAWA, 19 NOV. 1927

I am sending you a copy of the statement I made to the Prime Ministers' Conference. At the Conference, Mr. Taschereau made some remarks in which he said he was not interested in the creation of a laboratory system at Ottawa, as the French boys would not be able to go there because it would be conducted in English. The impression I got was that he conceived it to be a training school rather than a place where research was carried on. . . . It occurred to me that you might be willing to talk the matter over with him, as apparently he was, if not incordial, at least not interested. However, I was given the impression that Mr. Cannon* was not favourable, perhaps regarding it as a hobby on the part of some of us. I do not know what your relationship is to him, but if you think that you could do anything helpful there I would be personally grateful if you would do it.

Mr. Malcolm has asked me to make plans for a first unit, and I am

*The Hon. Lucien Cannon, Solicitor General.—M.W.T.

working on them. Probably we will go East in the Christmas holidays to have a closer view of some of the newer laboratories in the United States. . . .

TO PREMIER TASCHEREAU FROM H. M. TORY, OTTAWA, 21 NOV. 1927

. . . The staff at Ottawa will be a staff of trained scientific men who will carry on researches of their own. They will be men whose scientific courses in the Universities have been completed, and who will be on a permanent or temporary staff. A few . . . scholarships have already been given to French boys in the University of Montreal, and Dr. Frigon is cooperating heartily through the Polytechnique. I assure you that as much good will come from the work that is planned to the Province of Quebec as to any other province in Canada—perhaps more, as the centres in Quebec are becoming large industrial centres. As you know, Sir George Garneau is a member of the Council, and is heartily in accord with what we are planning to do. I would be glad, indeed, if you could find time to discuss the matter with him.

TO H. M. TORY FROM PREMIER TASCHEREAU, QUEBEC, 26 NOV. 1927

. . . I agree with you that I made a remark at the beginning of your address which showed that I did not understand exactly at first the plan that you were promoting. But the misunderstanding soon disappeared and I entirely concur in everything that you said.

TO COL. HARRINGTON (MINISTER OF MINES FOR NOVA SCOTIA) FROM H. M. TORY, OTTAWA, 21 NOV. 1927

. . . I have had in mind for a long time the possibility of undertaking some very definite researches in connection with the natural resources of Nova Scotia. If we only can get squarely started, there is a great work to be done, both in the Maritimes and in Canada as a whole.

TO H. M. TORY FROM COL. HARRINGTON, HALIFAX, 17 DEC. 1927

. . . If there is anything I can do to help the matter along, you may rest assured I shall gladly do it. . . .

1928

"We resent our friends' knowing us so well, when they understand us so poorly."— Jean Rostand, 1962

WITH NATIONAL LABORATORIES at last in sight, Tory wanted to make some appropriate changes in the NRC Act. He thought it would be wise to add several industrialists to the membership of the Council, but without reducing the number from universities. He also thought that every province should be represented.* He, therefore, proposed to enlarge the Council from fifteen to twenty-one members. But he ran into a good deal of opposition from various members of the Council, who thought that larger numbers would make the Council unwieldy. They also believed that several suggested changes in the Act would give Tory far too much power, and said so. Tory abandoned the attempt to revise the Act but, as one result, hardened his determination to replace Macallum and Ruttan at the first opportunity.* Although McLennan was a definite botheration,* Tory apparently felt that he could dominate McLennan* and therefore considered him a nuisance rather than a threat.

A difficulty with which the members of Council had to contend from the beginning was that in simple justice to the universities that they represented, as well as to their own competence, some of the grants in aid of research had to be awarded to some of their own number. This left them open to ignoble charges of meeting to slice up the pie among themselves. In fact they were most meticulous about this facet of their operations. In such a tiny scientific community, an occasional award had to be made to a member of

*Document quoted in this volume.

Council; it was inescapable; but it was a touchy and sensitive process and they were sometimes unable to take it in their stride; they needed to fuss a bit before they did it anyway.*

In June, Tory resigned his position as president of the University of Alberta and moved to Ottawa. The Council once more had a full-time president, the first since Macallum, who had resigned the chairmanship some seven years earlier.

In those days, the civil service was unable to pay scientists according to their merit, or to establish even the remote and tenuous connection between scientific competence and salary that prevailed in the world outside the service. The brightest scientific jewel in the service crown was the Dominion Rust Laboratory at Winnipeg, but even this was left to the inevitable erosion of low salaries.* The National Research Council was legally free from these hampering restrictions because it was outside the service. A suggestion was therefore made that the Council take over the Rust Laboratory.* However, at this time, Tory was reluctant to interfere with the inner workings of government departments in such a drastic fashion, especially the Department of Agriculture, and backed away rapidly (1). Besides, he had been largely instrumental in founding the Rust Laboratory and, just at the moment, there was more founding to be done.

In January, Mr. E. J. Garland, M.P., placed the following resolution on the Order Paper: "Resolved: That in the opinion of this House the time is now come when the further development of our country requires the establishment of a National Research Institute, and that this should be undertaken by the Dominion Government."

Malcolm asked Tory for background material that might be useful in speaking on this resolution in the House. When discussion of the estimates was imminent, Tory provided Malcolm with a superb statement of the scientific situation.*

Tory happily set himself to plan National Laboratories, taking care to "rub his wits" against large organizations such as the Mellon Institute and the Bureau of Standards. He thought the laboratories would require three million dollars but spread over ten years, since the work would without question "be paralleled by definite research development within the industries themselves."* He could not foresee that the three million would be spent within four years and that the laboratories would be opened in the deepest trough of the worst

depression of modern times, which would paralyse Canadian interest in industrial research for many years.

When the Minister of Trade and Commerce finally announced the Government's decision to proceed with the laboratories, the announcement was coupled with a declaration of intent "to gradually coordinate research work of government departments under one controlling organization."* This announced intent to coordinate was doubtless meant, in part, to conciliate the powerful Leader of the Opposition, Mr. Bennett, but many others also believed it to be desirable. Desirable as such a neat and tidy scheme might appear to the over-view of statesmen, it was based on ignorance of real scientific operations performed by actual men in a democratic society, and the hoped-for, tightly controlled coordination never did come about. King Canute also made a political decision once with much the same result.

No matter what the ephemeral ministers might say about control and coordination of research, the deputy ministers (who were "permanent" officials) were all of them set like concrete against the idea (1).

When Tory tried to change the NRC Act, both Camsell and Grisdale seized the occasion to protest vigorously against certain clauses that they had always resented, which gave the Council power to deal with natural resources. Camsell wanted the Council to agree formally not to invade the research territory of any department, and he considered the Council's freedom to pay higher salaries to be extremely dangerous to the civil service.* Grisdale had "very serious objections" to the clause that gave NRC the right to improve conditions in agriculture.*

None of the changes desired by Camsell and Grisdale were actually made in the NRC Act. This Act continued to give the Council power (on paper) to deal with natural resources and to pay at any salary level that it chose to set. However, Camsell and Grisdale had considerable effect on the actual course of human events, as distinguished from black marks on paper. In fact, the time was coming when the NRC would avoid any sort of laboratory work that could conceivably fall within the range of interest of a government department. When a few such items could not be avoided, the NRC sought thorough discussion and sincere agreement beforehand and, in effect, this became the operating policy,

without regard to what the Act did or did not state. The deputy ministers had made it very clear indeed that they would not stand for control or coordination of research that fell within their jurisdiction by any outside body; and that they considered themselves perfectly capable of preventing duplication and overlapping, particularly by the NRC.

Similarly, on the salary question, the unwritten operating policy for NRC became a rather cautious leadership, with higher salaries and greater freedom to reward merit quickly but not too much faster than was done in the service. These moderate salary gaps became extremely useful to the departments, since they could be pointed to as better treatment for scientific personnel within the area of government operations. This potent argument could not be vitiated by citing "fringe benefits," the counter-argument used by Treasury Board whenever industrial salaries were mentioned. In this fashion, the NRC salary structure was made palatable to the deputy ministers.

Within this general framework of natural checks and balances, the NRC settled down to the art of the possible.

Perhaps the most heartening thing that happened during the year was that Parliament provided $750,000 as an initial vote for the erection of the National Research Laboratories.

REFERENCE

1. Verbal, S. P. Eagleson to M. W. Thistle, 1956.

DOCUMENTS

INTERNAL RELATIONS

TO S. P. EAGLESON FROM HUME CRONYN, LONDON, ONT., 6 FEB. 1928

. . . I am not convinced of the usefulness of compelling the Governor-in-Council to appoint at least one member from each Province. There

is doubtless—what one may term—a strategic value therein, but one must remember the bar which mere distance erects, and which would prevent members of the Council—say from Prince Edward Island or British Columbia—attending Council meetings. After all, I presume this is a matter which the Government will eventually decide, and we must of necessity be governed by their view. . . .

TO S. P. EAGLESON FROM SIR GEORGE GARNEAU, QUEBEC, 8 FEB. 1928

. . . The greater representation from industry is the most desirable, but will we not be getting to the point where the number of members will make the Council rather unwieldly; section 10(g).—Should not the decision, as to what scientific and technical information should be published, rest with the Council? . . .

TO S. P. EAGLESON FROM A. S. MACKENZIE, HALIFAX, 9 FEB. 1928

. . . *Section 10(f).* I took exception to the formulation of this section when it was brought up some years ago. I could not see the point in saying that the nomination of officers should be by the President instead of by the Council whether they be permanent or technical. On the face of it, it gives the impression that no member of the Council has the initiative or privilege of suggesting the name of any officer, permanent or otherwise; and that I do not believe is right. In practice, as at present constituted, the members of the Council know each other so well that naturally we leave the selection of officers very largely to the President. But I am looking to the future. I can quite see that a new President of the Council might translate this section so as to believe that he had absolute and arbitrary power, and the Council none, and proceed to act in that light. This would entirely disrupt any Council, as they would feel that there was in that case no necessity for a Council. Dr. Tory will understand that I am not saying this in criticism of him or of his nominations, or anything of that kind. I am looking at it as a matter of psychology and for the good of the Council when he and I are both off it. . . .

TO A. S. MACKENZIE FROM H. M. TORY, EDMONTON, 23 FEB. 1928

. . . My own private opinion is that before very long we shall have to hold two types of meetings. . . . The first meeting need not be attended by the industrial members at all as much of our academic discussions

would be wholly uninteresting to them and would give them an entirely wrong impression of what we are trying to do. In the second meeting problems would be discussed in which they have interest.

I hold firmly to the opinion that there should be representatives from every province in Canada whether they attend all the meetings or not as it would remove criticism and help to create an atmosphere of unity.

. . . With regard to section 10f, I respectfully suggest that . . . there is the authority conferred upon the President by every University Act on the North American Continent which has been written within the last twenty years. It is made definite in the University of Toronto Act to avoid the possibility of political interference. It gives the President the right of nomination and the Council the right of veto. The agreement between these two must be reached before an order-in-council would be passed. For the Council to appoint someone to whom the President took strong objection would be in my judgment equivalent to asking for his resignation. The Council is protected by the fact that no nomination of his could reach the order-in-council stage without the approval of the Council. Personally, I would not sit as President of the Council for ten minutes without that small item of protection. As a matter of fact there is not a single authority conferred upon the President of the Council under the Act which is not subject to the veto and final control of the Council. I am sure that the authority exercised there is the authority which you yourself exercise in connection with all university appointments. . . .

With regard to publications, Ruttan has made a suggestion about this matter which would satisfy me completely, as it would give the desired promptness of action, i.e., to substitute the word "Council" for "President" in the act and the Council to give the President authority between meetings to act on the approval of the publication committee. So far as I am concerned that would meet the case absolutely. . . .

The majority of the Council have approved of the suggestions but I think it unwise to hand them to the Minister so I am telling him there is no time to get the matters settled.

TO R. F. RUTTAN FROM H. M. TORY, EDMONTON, 21 FEB. 1928

. . . [Re] the appointment of temporary officers: I think you have missed the point of the amendments. At the present moment it is questionable whether we have the right to appoint men temporarily employed by the Council. So far, the Auditor-General has been willing, if the money was voted to a committee, that the committee might employ such assist-

ance as was required out of their vote. In order therefore to get any work done other than by the permanent staff, it has been necessary for us to place all our money under a committee. For example, the money voted for the magnesite has been put in charge of the Magnesite Committee, although the staff working upon it are working in our laboratories at Ottawa and paid directly by cheque from the office out of that vote. These men are not now appointed by Council but by the Committee. As the Act stands that question may come up at any time and we may find it necessary to get an order-in-council passed approving of every person working for us, even in the most temporary way. All I was seeking to do in amending that section was to get the power of nomination and employment of temporary members away from the necessity of an order-in-council, leaving the permanent members still under the order-in-council system. . . .

Please believe me when I say that there has never been in my mind any thought but that every action of the President, as the executive officer, should be subject to the general control of the Council. I am sorry if any action of mine has given members of the Council reason to be suspicious. I can only say that it is the first time in my life that a suggestion of any desire to exercise undue authority has been made concerning me.

TO S. P. EAGLESON FROM CHARLES CAMSELL, OTTAWA, 11 FEB. 1928

. . . In order to carry out what I believe to be the President's policy with respect to the relations of the Research Council to permanent Government departments carrying research work, I would suggest that Section 10(c), (i) of the Act be amended as follows:

(1) "To promote the utilization of the natural resources of Canada, *provided however that where a department of government exists for the purpose of carrying out research or investigative work in a certain field to refer all problems in such field coming before the Council to such department and to assist in their solution.*"

(2) Amendment to Section 10(f) will permit the Council to appoint temporary employees "in order to effectively carry on the work of the Council".

Under this clause duration of employment might in fact become permanent by extending the term of employment indefinitely. This, I think, is not desirable because it would have

a dangerous effect on technical employees in Government departments if the salary paid were much out of proportion to those in the permanent service. I think this sentence should be struck out and the amendment applied only to temporary employees engaged for special investigations.

(4) Section 10, (c), (vii) seems to be unnecessary since the Department of Agriculture exists for the same purpose. In my view it is highly undesirable to set up two distinct organizations of the Dominion Government to carry out the same kind of work. The object of my suggestion under (1) is to obviate the possibility of overlapping of this kind.

TO S. P. EAGLESON FROM J. H. GRISDALE, OTTAWA, 16 FEB. 1928

. . . I have very serious objections to clause 10 (c) (vii) as it stands at present which gives to the Council the right to undertake research work—the object of which is to improve conditions in agriculture. This seems to me to be entirely too broad. The Federal Government has already a large Department of Agriculture functioning throughout the Dominion and carrying on research work in many fields, and it seems to me that the clause in question might be amended or rescinded, as under present conditions it would appear that the Department of Agriculture and the Research Council are both given power to conduct research work in agriculture. I do not see why research work in agriculture should be particularly placed under the jurisdiction of the Research Council any more than research work in any other Department, and the removal or amendment of the clause in question would prevent any danger of overlapping in this field.

TO H. M. TORY FROM A. B. MACALLUM, MONTREAL, 7 FEB. 1928

. . . With regard to Section X, (g), I cannot bring myself to approve of it. I do not know why such a change has been suggested—vesting all the power of deciding whether anything shall be published in the President and giving the Council no power in the matter at all. According to the Act of 1924, the Council may, from time to time, subject of course to the approval of the Chairman of the Privy Council Committee, publish such scientific and technical information as it may deem necessary.

Why should this power be taken away from the Council and vested

wholly in the President? As the Act of 1924 reads, it gives the President enough power without endowing him with any more—in fact there has been some sharp criticism of the Act of 1924 just on this very score. If the Council is at all properly constituted, it should have the right to determine whether publication in the matters referred to should be permitted. I cannot think that this proposal is a wise one. . . .

TO A. B. MACALLUM FROM H. M. TORY, EDMONTON, 21 FEB. 1928

In view of the objections raised by you and one or two others and in view of the fact that the Minister himself prefers to let the whole matter stand over and does not care to press for amendments this year, I have decided to withdraw my suggestions. It seems to me some of you are in a rather suspicious mood. As a matter of fact all that was intended was that we should be able to publish what we thought wise without going to the Minister. At the present moment, a matter for publication must have the Minister's initials. If the section passed as suggested, it would mean that the initials of the President would be sufficient to secure publication. It was my intention to have a publication committee appointed to which all matters of publication would be submitted and whose approval would be necessary before publication. There was never such a thought as the President exercising a veto on the Council's wishes. I cannot conceive of any man who is worthy of being President of the Council wishing to use his authority in such a way. At present, there is often a long delay in getting the Minister's consent and all that I am trying to do was to avoid that delay.

With regard to the criticism of the powers already conferred on the President of the Council, I have only this to say, that they are only the ordinary powers conferred upon responsible people occupying similar positions all the world over. There is not a single authority under the Act which the President can exercise that is not subject to the Council's control and I suggest to you that you write down a single word in the Act that is not consistent with that statement.

TO FRANK D. ADAMS FROM H. M. TORY, EDMONTON, 16 FEB. 1928

. . . I think you had better write to Morrow. . . . tell him that you are convinced that Graham is the best man in Canada and that we have agreed that he is the man who should undertake the work. . . . Surely,

Mr. Morrow will not get angry. If he does, he will just have to get angry. Write him a smooth letter and trust the rest to Providence.

Sincerely yours,
PROVIDENCE.

TO H. M. TORY FROM SIR ROBERT FALCONER, TORONTO, 14 FEB. 1928

I was very glad to see in this morning's paper that the Government has come out so handsomely in regard to the Research Laboratories at Ottawa, and I want to congratulate you on this happy issue out of so many of your troubles. I hope that you will find it plain sailing from now on, though undoubtedly difficulties will face you. I presume that this means that you will soon have to resign your work in Alberta. You are now given a magnificent opportunity, and I am sure your friends all hope that you will have health and strength, as they know you have the ability to carry it through with success.

TO SIR ROBERT FALCONER FROM H. M. TORY, EDMONTON, 22 FEB. 1928

Thank you very much for your letter of February 14th.

The effort to get the Research Work recognized has been a long and hard struggle and I am not sure that I have been personally justified in the effort I have made as I find myself at the moment rather weary of work. Perhaps it will be plain sailing from now on, but to be perfectly frank I am not looking for any other condition until some of the present members of the Council have ceased their connection with it. My own future relation to the matter is still somewhat in doubt. I realize that there is a great opportunity: I have now to find out whether the handicaps, political and otherwise, which would be placed upon me in connection with staff, etc., would be such as to render the doing of good work ineffective. . . .

TO H. M. TORY FROM F. E. LATHE, OTTAWA, 10 APRIL 1928

. . . The suggestion which you had proposed making to the Council was that a small committee should be appointed to give preliminary

consideration to the question of X-ray dosage and the use of ultra-violet light and to make such representations to the Council as they might see fit. You suggested for this Committee Dr. A. L. Clark as Chairman. . . .

This question came up for discussion while I was talking with Dr. McLennan. He asked me numerous questions regarding it and I told him what you had in mind. He approved of the membership of the preliminary committee suggested by you, but strongly felt that he himself should act as chairman. . . .

. . . I remember the reasons you gave why Dr. McLennan should not act as chairman of this committee and think they were quite sufficient. I would prefer, however, to leave the matter entirely in your hands for decision.

TO F. E. LATHE FROM H. M. TORY, EDMONTON, 28 APRIL 1928

In reply to your letter of the 10th: with regard to the Committee on Radiology that matter is to remain in my own hands and Dr. McLennan is not to take the initiative in it. The Committee is going to be a separate committee from the Physics Committee as it is not directly speaking a question of Physics. You may tell Dr. McLennan that I wish the matter to stand until I come again to Ottawa when I shall take immediate steps in connection with it. . . .

TO H. M. TORY FROM SIR ARTHUR CURRIE, S.S. "MONTROSE," 28 JUNE 1928

I suppose Macallum and Ruttan will shortly resign from the Research Council. If and when they do, I hope their places will be filled by two other McGill men. I shall be away for about three months and would like to consult with you before any appointments are made. . . .

TO SIR ARTHUR CURRIE FROM H. M. TORY, EDMONTON, 10 JULY 1928

. . . Now with regard to Ruttan and Macallum, I don't think they have the slightest intention of resigning from the Research Council. They both appear to be making plans to stay on permanently. Their three-year term, however, runs out on March 31st, 1929. The usual thing is to re-appoint,

unless there is good reason for not doing so. This is a bad habit the Research Council has got into. I am going to do my utmost to change the system before March 31st arrives, and I hope that before long I will have an opportunity of discussing the whole matter with you.

TO H. M. TORY FROM A. B. MACALLUM, LONDON, ONT., 25 JULY 1928

. . . As to the grant of $1700 given in 1925 being made to me personally, if I had known that that would be the interpretation I would have objected. I think every member of the Council should avoid anything that will be the basis of a charge against the Council. Recently it was claimed to me that certain members of the Council were feathering their own nests out of the Council's financial resources. I, as Chairman of the Assisted Researches committee, had to be very careful not to be charged although in other quarters it was represented to me that thereby I was not looking after the interests of my Department in McGill. . . .

RELATIONS WITH CABINET MINISTERS

TO THE HON. JAMES MALCOLM FROM H. M. TORY, EDMONTON, 6 JAN. 1928

. . . With regard to expenditures for the current year, naturally, we should not require a million dollars for the year 1928–29, as such a building could not be completed before the summer of 1929. I should therefore suggest that you ask for a capital vote of $750,000 for building and equipment, this year. . . . I should think that the four units could easily be constructed and equipped within the sum of three million dollars over a period of probably ten years. I would not expect to see the whole construction scheme finished in less time than that. I am of the opinion that the demand would not necessitate more rapid development than that, as, without question, the work on the National Laboratories would be paralleled by a definite research development within the industries themselves, as has been the case in the United States, where the latest figures show over one thousand laboratories are now at work on industrial problems within the industries themselves, in addition to all the work being done through government agencies.

With regard to the current account, I left a note with Mr. Parmalee, asking for $300,000 on current account for the current year. As it turns out, we are finding ourselves short of money. The demand has been great enough to absorb more promptly than we thought the vote made last year. If it would be within your power to raise the vote from $300,000 to $350,000 for the current year, I think it would be wise to do so, as it would enable us to handle many new and pressing problems. . . .

TO THE HON. JAMES MALCOLM FROM H. M. TORY, OTTAWA, 23 JAN. 1928

Following our conversation today regarding Mr. Garland's resolution, it occurs to me today that the best form of statement for you to make regarding the matter, if you feel that you should speak upon it, would be to give a brief sketch of the history and accomplishments of the Research Council and to give as reasons why there has been delay in providing a national research laboratory system the following—

1st—The idea of national research effort is a modern idea, having begun as far as the British Empire is concerned only in 1916. Public opinion had to be created in order to enable the Government to justify the expenditure which would be required.

2nd—The financial situation in Canada, due to the Great War, which happily now is passing.

In view of the fact that a clear conception of the significance of scientific research is now in possession of the public mind and has behind it public opinion, and also in view of the fact that the financial situation in Canada has improved so much, you are now taking steps to put national research on a proper basis by the establishment of national research laboratories.

In the copy of the Annual Report of the Council for the past year, which I am sending you today, you will find the whole story told in the first 24 pages of the Report. The part most important from your point of view I would suggest would be from pages 11 to 24, more especially the section under "Assisted Researches" beginning on page 13, where you will find summarized the researches that have been undertaken with regard to agriculture, forestry, mining, electrical industries, fisheries, fur production, manufacturing, the construction industries, service industries, medical researches and researches in pure science, followed by the amount of money spent and the manner in which it has been spent on page 24.

I would also like to call your attention to the list of 371 scientific papers covering work carried out under the auspices of the Research Council, which have been published in various technical journals. The list will be found in Appendix "A.". . .

If you desire fuller information regarding any of the researches now under way, you will find it in sections 4 and 5 of the Report, dealing with the past year's work.

TO THE HON. JAMES MALCOLM FROM H. M. TORY, OTTAWA, 23 JAN. 1928

Following our conversation today, I beg to say that in the Order in Council passed on June 6th, 1916, in which the organization of the Research Council was originally set out, you will find one paragraph in the following words:

> The Minister, therefore, recommends the appointment of a Committee of Council to consist of the Minister of Trade and Commerce, the Minister of the Interior, the Minister of Mines, the Minister of Inland Revenue, the Minister of Labour, and the Minister of Agriculture, which shall be charged with, and responsible for, the expenditure of any moneys provided by Parliament for scientific and industrial research, etc.

This is the Committee under which the Council has been operating since its inception.

The Act assented to on July 19th, 1924, under which the Research Council is now operating defines more definitely the authority and responsibility of the Research Council, but it leaves the Committee of the Privy Council as appointed under the original Order in Council.

I think it should be assumed that a new Committee could only be appointed to handle this project if it superseded the original Committee by an Order in Council. I do not know under what authority the new Committee was appointed—whether merely by an arrangement within the Cabinet, or by a special Order in Council.

You will find the full Order in Council in Appendix E to the Report of the Council for the year ending March 31st, 1918. . . .

TELEGRAM TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 13 FEB. 1928

Garland resolution debated in Commons tonight and everyone favourable. Malcolm announced decision to establish laboratories on ten acre plot to be provided by Agriculture Department at experimental

farm and to provide three million for capital over five to ten year period. Also declared intention to gradually coordinate research work of government departments under one controlling organization.

TO R. O. CAMPNEY* FROM S. P. EAGLESON, OTTAWA, 18 FEB. 1928

. . . *Revision of Research Council Act.* Section 7 of the Research Council Act reads as follows: "The Council is hereby constituted a body corporate capable of suing and being sued and having the power to acquire money, securities, real estate, or property by gift, grant, bequest, donation or otherwise, and of holding lands, tenements, hereditaments, goods, chattels and any other property, movable and immovable, for the purpose of, and subject to, this Act."

I do not pose as an expert in legal matters, but I think there is no doubt that under the above section the Research Council has full power to undertake without further action by Parliament or by the Governor in Council the erection of laboratories for the purpose of carrying out its work with any monies which may be placed at its disposal.

Furthermore, Section 10 of the Research Council Act, a copy of which I attach hereto, describes in detail the nature of the work which would be undertaken in such laboratories. . . .

TO THE HON. JAMES MALCOLM FROM H. M. TORY, EDMONTON, 11 FEB. 1928

. . . I also have a letter from Sir Arthur Currie telling me that the Interior Department are trying to establish laboratories for fundamental research in general and organic chemistry in connection with the pulp research work at McGill University, Montreal. This is nothing more than another step in the direction of disintegration. Now that the idea of research has become popular, everybody is trying to grab a bit of it and I would strongly urge upon you to do everything in your power to prevent such disintegration. . . .

TO THE HON. JAMES MALCOLM FROM H. M. TORY, EDMONTON, 29 FEB. 1928

I have now received the final report of the debate on Garland's resolution in the House of Commons and in thinking over how I might help

*Private Secretary, Department of Trade and Commerce.—M.W.T.

you with material for the discussion when the estimates come up, it occurred to me that I could do no better than go through the official reports and suggest to you answers to the points raised. I shall take them in the order in which they occur. You can then fit them into your own method of dealing with the matter as you see fit.

In Bennett's statement on page 29 of the official report for Monday, January 30th, and his further statement on page 451 of the official report for Monday, February 13th; three points are raised—

1st. The necessity of avoiding duplication,
2nd. The impossibility of doing work under departmental control,
3rd. The necessity of our keeping in touch with what goes on in other countries and bringing this knowledge to the industries of Canada. . . .

Duplication of Research

With regard to the first viz., duplication: of course it is fundamentally wrong for any department of Government and the Research Council to deliberately duplicate each other's work on a specific problem and that should be frankly stated. As a matter of fact the Research Council has been acting as a clearing-house to prevent duplication. The general practice is this,—When a problem is presented to us, if it is a problem that can be in any way associated with work now being done by any branch of the Government we refer it to the head of that department of Government to see first, whether they are working on it, and if not, second, if they can undertake it, and if so, in what way the Research Council can cooperate. If you will turn to the section of the Report for 1926–27 (typewritten copy), now in your hands, under the sub-title, "Cooperation with the various departments of the Federal Government", page 47–55, you will see set out the manner in which we have been cooperating with the various departments. In many of these cases we are pushing the investigations under a joint committee of the department and the Research Council and bringing, wherever university men are available, the universities into the investigation. Where the problem is a complex one our method is to divide it up into parts, giving to individual groups parts of the work, so that there will be no unnecessary duplication. In some cases, we deliberately give two groups exactly the same work to do by different methods, in the hope that one or the other may succeed. Under that section you will find how we are working in connection with the Department of Agriculture, the Department of Customs and Excise, the Department of the Interior, the Department of Mines, the

Department of Marine and Fisheries, the Department of National Defence and work done directly under your own Deputy in the Department of Trade and Commerce. The National Research Council is really a clearing-house for the better organization of research.

Differences Between Countries

On the other hand, it ought not to be admitted for a moment that we are not to undertake researches that are being undertaken in other countries. In this connection refer to the statement by Mr. Ross in the Senate Report, January 31st, page 9, in which he says that while he is in favour of scientific research it is only upon condition that, "it is conducted along lines that are not being followed by other nations who are as rich or richer than we are." That statement is wholly misleading. For example, iron ore research is being carried on in every country in the world that has iron ore, for the simple reason that the chemical conditions to be overcome are different in different countries. Coal research is being carried on in every coal country in the world for exactly the same reason, viz., the chemical composition of coals in different countries is different. Take, for example, the coal in Canada. There are two fundamental problems in connection with coal research in Canada. In the Maritime Provinces the problem is one of the sulphur content of the coal. The Mines Branch has been working at that in a small way for some years. In Alberta, there is no problem connected with sulphur: the difficulty to be overcome is in connection with the water content of the coal. For example, if a suitable process of carbonization can be found for Alberta coal so as to eliminate at reasonable cost water and other useless ingredients, the change in the thermal units of the coal would be equal, from a transportation point of view, to a reduction of 25% of the freight rates from Alberta to Ontario. I have suggested, and in this I have the backing of the ablest coal man in Canada, Professor Stansfield, that in connection with the problem of freight rates intensive research should be carried on to eliminate waste in the transportation of useless material that is really not fuel at all. Some day that will be done.

England, Germany and the United States are all working intensively at the coal problem, Germany especially at the problem of turning coal into oil, but they each have their peculiar problems due to the peculiar conditions of their own industry. Work done in Germany may be useful to us from the point of view of suggesting ways of approaching our problem, but our own Canadian problem may still remain.

Differences Within Countries

Taking Mr. Ross' own illustration, the investigation of the growing and feeding of steers. He does not seem to realize that the real reason for duplication in the various provinces is because of the difference in food available for feeding steers in the various provinces. In Alberta, we have the problem of the use of our native wild grasses, a problem quite different from the problem of the cultivated grasses of the East. A balanced ration in Alberta therefore becomes a different problem from a balanced ration in Ontario. Probably, the work done in Alberta might be suitable for the Province of Saskatchewan but in all probability it would be totally unsuitable for the Province of Ontario.

Another illustration might be useful to you: the problem of the life-history of the wire worm. In eastern Canada and the New England states it had been worked out completely by entomologists. When we came to face the problem in Alberta it was seen that the treatment for the difficulty that was common in the East had no effect whatever in the West. A thorough investigation of the life history of the wire worm in Alberta was undertaken and it was found that its habits of life were different under our climate and soil conditions and a completely new approach to the problem had to be undertaken. In a very short time we were able to give directions as to successful methods of handling the problem, wholly different from ones previously in use.

Differences Between People

But there is another reason why similar lines of work are being carried on in different countries of the world. The fact is that even where the problem is the same the undertaking of research is generally the result of the working of an individual mentality. A man finds himself interested in a particular problem and thinks he sees a way of approaching the problem. His first step is to get hold of all the literature on the subject and see what has been done. If the line of work that occurs to him has not been undertaken before, then he sets himself the task. It frequently happens that almost identical solutions of problems are found by men working on this side of the Atlantic and the other side of the Atlantic, but the fact remains that the economic benefit goes to the nation which gets the solution first. Patents of enormous value have been taken out in Canada by German firms where the work might just as well have been done in Canada and the patents be the right of our own people. In all such cases the industrial development takes place in

the country which makes the discovery years before it does in other countries.

The Problem of Secrecy

Further, it is well that Parliament should understand that most of these investigations are carried on in secret and even if you have searched the whole of the literature on the subject the best you can say is that no publication has been made of work done; nor is there any way of finding out whether private individuals or firms are already on the road to a solution of the problem. Scores of incidents can be given where duplication of research has been carried on under conditions which made is impossible for one to know what another was doing. Identical or similar solutions of the same problem have been found almost simultaneously because the work was secretly done.

The Research Council has at present working plans to place all the literature on a given subject on which it undertakes an investigation in the hands of investigators before any work is undertaken, to make sure that the particular problem is still unsolved. . . .

Government Departments and the NRC

2nd. With regard to doing work under department control: it should be frankly stated that splendid work has been done in the departments of Government where there has been an organization suited to research. On the other hand it should be stated with equal frankness that men engaged in the routine tasks of government departments generally find it impossible to carry on research on any considerable scale along with other routine duties. The real reason for this is that real research men are rare and require a more intensive kind of training and then only in relation to work for which they have a natural bent. Occasionally in the solution of practical problems of a certain type a man who is a mechanical genius will solve problems that will escape the more highly trained man but these constitute the exceptions that prove the rule.

The real reason for the National Research Laboratories is that there can be employed a group of men trained for research without routine responsibilities that are necessary in the management of a department and their whole thought and mind will be concentrated upon the problems assigned to them and for which they are specially trained. The way in which departmental work should be carried on in its relation to the Research Council is that if a particular problem comes up, let us say in connection with Agriculture, where it can be undertaken successfully

by the Department of Agriculture with assistance from the Research Council then clearly such assistance should be given and the research organized so that every phase of it is covered. The Rust Research illustrates this perfectly. The Research Council brought about the organization of a joint committee including the Dominion Department of Agriculture and the specialists of the western universities. The scheme of research was then outlined and different aspects of it given to different groups of workers. The Bovine Tuberculosis research is perhaps a better example. In connection with this the Research Council brought about the organization of the committee including the department of Bacteriology of McGill University, the University of Montreal, the University of Toronto (including the Connaught Laboratories), Queen's University, and the University of Alberta and in addition two of the best sanitaria in the country, one in the East and one in the West. No such concerted attack would have been possible excepting under the organization which the Research Council created. Had such an organized effort not been made it is possible all the workers might have secretly stuck to a single aspect of the problem.

I think that nothing should be said in the discussion deprecating the work done by the departments of Government but the function of the Research Council in coordinating effort and avoiding duplication should be emphasized.

Information Services

3rd. With regard to the third point raised by both Mr. Bennett and Mr. Cahan viz., the necessity of our keeping in touch with what goes on in other countries and bringing this knowledge to the industries of Canada, this I have already touched upon in relation to the first point.

When any problem is submitted the first thing the Research Council does is to have the whole of the literature on the subject covered to see what has already been done. The next step is to examine patent records to see if anything in relation to the problem can be found in issued patents. This knowledge is made available to the research committee and in the light of that knowledge it is decided whether the work should be gone on with. The Research Council is now taking all the standard industrial and scientific journals along with the journals publishing abstracts of the new knowledge coming out in the scientific journals. In so far as it has been possible with the small staff at our disposal this material is reviewed regularly. Every likely new departure is abstracted with a view to a careful study of the material by the Research Council and where it seems wise communication is had with the industries in

the country. One branch of the Research Council's work will be the firm establishment of an information bureau which will relate itself actively to the commercial organizations. This will work in conjunction with the Natural Resources Intelligence Branch and the corresponding department in the Ministry of Trade and Commerce.

Further, we have established confidential relations with the British Research Council. They are sending us monthly reports in a confidential way of progress made in research and we are giving them the fullest information along our lines of work. In addition to that we are in close touch with what is going on in the United States where that is possible. Of course, work is being done by private firms upon which millions are being spent in the United States which is not open to us and therefore the best we can do is to deal with public documents. . . .

Trial and Error Versus Science

Coming now to the address of Mr. Cantley, official report of February 3rd, page 450, he refers to Mr. Garland's error being one of exaggeration and then he goes on to say, "We in this country in common with the mother country have made progress mainly through the old road to progress which is by trial and error. In that way was worked out for us nine-tenths of the problems in the industrial fields. The pioneers in industry in this country as in other countries wrought out without scientific research and in most cases without scientific knowledge a great many of the fundamental problems of this country as was also done in other countries." To a certain extent Mr. Cantley's statement is true; that British industry and Canadian also has plugged along without very much scientific research until recently, but he should have stated the corollary to it that in pre-war days the scientific work of Germany was forcing Germany forward at such a rate that she was capturing the markets of the world from Great Britain and that outside of our own protected industries in Canada we had practically no considerable export trade of an industrial kind. Our trade was very largely in raw materials. Many of our industries as you too well know could not have lived an hour in open world competition.

Call his attention however to the fact that things are completely changed now in England. There, they have spent five times as much on coal research alone in the last few years as we have spent altogether in Canada in the last ten. You will find a complete statement of what is now going on in England beginning on page 5 of my address to the Prime Minister's Conference.

The truth is that industry is becoming every day more technical and

more dependent upon science and the old hit and miss methods of trial and error are now hopelessly out of date. For example, the electrical industries as a whole, excepting for routine things of a very simple character, are conducted wholly as the result of pure research.

The use of the waste products of our forests will only be overcome by intensive research. The same applies to our mineral wealth. The iron ores of Ontario will ultimately without question be brought into use but it will be when the man with the research mind has overcome the difficulties associated with the peculiar chemical qualities of these iron ores. I am confident that it will only be a little while when this will be done. The preliminary work of the Research Council laid the foundation for the ultimate solution. You will find it all set out in the Report on Iron Ores published by the Research Council three or four years ago.

The Universities and the NRC

There is only one other point that I think I need ask you to be on guard about and that is the relation of the Research Council to the universities. Mr. Bennett apparently has been in communication with someone at McGill over the difficulties that they were having with the Pulp and Paper Laboratories at the University. Mr. Stewart is familiar with that and will no doubt be able to answer any questions about it. . . .

I would ask you to emphasize the fact that the Research Council has always used the universities and intends to use them to the limit of their capacity. You may state that a large part of the research work being carried on in the Canadian Universities today has been made possible by the assistance of research grants to university professors and scholarships to university students recommended by their professors. We have now the fullest cooperation of every university in Canada capable of doing research work. Since I have been associated with the Council no application for a bona fide research of general interest from a university professor who could show the necessary training has been refused. We have been both anxious and ambitious that our universities should lead the way in fundamental research. You cannot over-emphasize our relation to the universities and the university professor. If you care to quote me you may say most emphatically that there is one thing I desire most earnestly in Canada and that is that one or two of our universities should develop great research schools comparable with those in the United States, Great Britain and Germany and that in so far as promoting research by the Research Council within the universities will assist in bringing that to pass it will have my whole-hearted support.

. . . It would appear that you need to meet Bennett on the basis of emphasizing cooperation and non-duplication excepting where duplication is necessary to make sure of results. . . .

TO THE HON. JAMES MALCOLM FROM H. M. TORY, OTTAWA, 28 NOV. 1928

. . . (1) I have seen Mr. Sproat over the building plans. The first expression of opinion he gave me about the matter was that the building we were proposing, being just over 400 ft. long, made it impossible to give the kind of treatment that was suggested by the post card you sent to him. The building on the post card would be approximately 200 ft. long. His general purpose in developing the centre of the building and two doorways half way down on either side was to break the building up in three sections. Merely to give special treatment at the centre and at the two ends, in his opinion, would make an unbalanced building.

I think perhaps both you and Mr. King received the impression of a more severe looking building than it really is. . . .

(2) With regard to the salary list which was submitted to Council for approval last week. . . .

You will see that the American salaries in the upper grades are $1,000 to $1,500 more than ours.

I sincerely hope the scale of salaries submitted will be approved promptly, as it is becoming increasingly clear to me that our major difficulty is going to be to get men of the sort we want. My inquiries in the United States have led me to the conclusion that while there are many Canadians of high calibre in the United States who would be glad to return to Canada, salaries in the United States are such as to make it difficult to bring men home from there. On the other hand, the numbers in Canada are not sufficient at the moment until more men are trained to fill positions of senior responsibility.

As stated, I am going to Winnipeg for a meeting of the Grain Research Committee, and will go from there to Minneapolis to study this whole question of protein in wheat in order that you may have at least a progress report for Parliament on the question submitted by Parliament to the National Research Council last winter. I will look also into the whole question of staffing the laboratory in Winnipeg while I am there. . . .

I had a conference this morning with Sir Joseph Flavelle and Premier Ferguson. I am confident that Sir Joseph Flavelle intends to cooperate

with us in every way. I have also spent a couple of hours with Mr. Speakman, who is director of their work. I think he feels the same way. The only thing that worries me about it is that apparently the Manufacturers' Association have undertaken to collect money for the Ferguson scheme; to what extent they will succeed I do not know. But in any case I am confident that Sir Joseph Flavelle will not be a party to any contentious schemes. I was more impressed than ever with the political potentialities of a man like Ferguson, but I also came to the conclusion that he was seriously trying to promote the ideals we have in view. . . .

TO THE HON. W. R. MOTHERWELL (MINISTER OF AGRICULTURE) FROM H. M. TORY, 12 DEC. 1928

I have had a request from your Acting Deputy that you be permitted to attend the meetings of the Tuberculosis Committee of the National Research Council. I find myself greatly embarassed in replying to this letter, and thought it wiser to write directly to you, so that the content of this letter need not be known to anyone but yourself.

The facts of the situation are as follows:

The Tuberculosis Committee is a committee carefully selected from among the scientific men of Canada and from representatives of some of the breeding organizations. The personnel of the Committee was agreed upon by Dr. Grisdale and myself. . . .

I greatly fear that if a Minister of the Crown were to appear in the discussion, many of these men would feel that political influence was being brought to bear upon them, with the result that they would be inclined to promptly leave the Committee.

I talked the matter over with Mr. Malcolm today and he agrees with me that it would be quite unwise for either him or yourself to appear at the meetings of the Committee. The whole time of the meetings will be devoted to discussion of the scientific aspects of the problems before them.

The standing of the men on this Committee should be a sufficient guarantee to your Department that no recommendations will be made other than those based on the most searching scrutiny of the scientific facts submitted. May I add that a shorthand report of the proceedings will be taken and duplicated. When completed, a copy of this will be given to both Mr. Malcolm and yourself.

TO H. M. TORY FROM THE HON. W. R. MOTHERWELL, OTTAWA,
19 DEC. 1928

. . . I had no thought of asking, through my Acting Deputy or any other source, to be permitted to attend meetings of the Committee in question. I did, however, sense a very evident feeling on the part of my officers, who, in the absence of Dr. Grisdale, Joint-Chairman of the Tuberculosis Committee of the Research Council, experienced in anticipation the lack of a friend in court during the proceedings of the said Committee.

I indicated to one or more of my staff that, if the matter of Dr. Grisdale's absence were brought to my attention by you, I would recommend, if I might, that Dr. Archibald act in lieu of Dr. Grisdale, as Joint-Chairman with yourself. But, inasmuch as the event of the meeting of the Committee has now gone into history, I need comment no further upon the matter except to express regret that I occasioned you any embarrassment in connection with the phase of the question under consideration, and possibly to pass some observations on what you fear might have happened if a Minister of the Crown were to appear in the picture at all. The paragraph in your letter, to which I refer, is as follows: "I greatly fear that if a Minister of the Crown were to appear in the discussion, many of these men would feel that political influence was being brought to bear upon them, with the result that they would be inclined to promptly leave the Committee."

From my fairly long and friendly experience with research workers and scientists generally, I have never yet noticed any disposition on their part to resent the presence of a Minister of the Crown, much less show any disposition to promptly leave a committee meeting on the appearance of such a Minister. Indeed, the very opposite has been the case, the Committee of Scientists usually extending some form of welcome to their visiting or participating lay co-workers.

You will recall on the occasion of the Rust Conference, held in Winnipeg on the 10th September, 1924, over which you and Dr. Grisdale also presided as Joint-Chairmen, that I was present and participated—without any consciousness of impending danger, in the rust discussion that followed so fully and freely during the whole day. Instead of there being any visible evidence of any parties to that Conference—and there were several very important delegates from the United States—showing any disposition to bolt for the door on the approach of somebody else, it was one of the finest and most useful get-together Conferences that it has been

my privilege to attend for some time. However, as you may have been jesting, although the context scarcely bears out such a conclusion, when you penned the paragraph above referred to, we will let the matter drop there.

I noted with pleasure in the press reports that the T.B. Conference recently held in Ottawa, decided to discontinue the Calmette Vaccine, except with bovines, and, if this report be correct, I desire to congratulate the Research Council on taking such a humane and common sense stand at this juncture in declining to further administer a vaccine to babies, the effect of which has not yet been determined in Canada upon domestic animals. Naturally, I was also pleased to know that one of my officers, Dr. Watson, was one of the most pronounced in favour of confining the use of Calmette Vaccine to bovines, rather than including humans, and that Dr. Hilton seconded the motion by Dr. Savage that no specific pronouncement be made upon the effect of Calmette Vaccine until further investigation and research disclosed more conclusive evidence of immunity and efficiency, following the use of this Vaccine. . . .

TO THE HON W. R. MOTHERWELL FROM H. M. TORY, EDMONTON, 18 JAN. 1929

. . . Referring to the second paragraph of your letter, I regret exceedingly that any misunderstanding arose with respect to the matter contained therein. Had I known that you had not requested permission to attend the meeting, I certainly would not have written my letter of December 12th. Your Acting Deputy told Mr. Eagleson definitely that you were anxious to attend.

. . . If there had been any feeling on the part of your officials that the case would be prejudiced, there has been no justification for such a feeling, so far as I am aware. Newspaper agitations over the matter should not be confused with the attitude which such a group of scientific men would take when the evidence was before them.

With regard to the question of the advisability of a Minister of the Crown attending our meetings, may I begin by saying there is no one who would be more welcome than yourself because of your entirely friendly attitude toward scientific endeavour. This meeting, however, was a totally different kind of meeting from the one which you attended in Winnipeg. . . .

With regard to the second last paragraph of your letter, I fear that you have been misinformed as to the decision of the Research Council

with regard to the use of the Calmette vaccine. Before stating the action of our Committee, perhaps you will bear with me if I take space to outline for you the present position of scientific opinion with regard to the use of BCG.

BCG, as you are already aware, is claimed by its originators to be a non-virulent strain of tuberculosis bacilli, which, when used as a vaccine, confers resistance to virulent tuberculosis bacilli, the action being similar to that of vaccination for smallpox. In both cases the non-virulent bacillus is of bovine origin and confers resistance to the disease in humans.

The two points which had to be given consideration were—

1. Would the vaccine do injury to persons or animals upon which it was used?
2. To what extent would it confer immunity against the disease when it was used?

Calmette, who originated this investigation, began his work in 1908, commencing with laboratory animals. He then extended his work to bovines. He demonstrated to his own satisfaction that in neither case was it injurious and that in the case of bovines, at least, it conferred immunity to a very large extent. This was followed by a trial of the vaccine upon anthropoid apes. His published report of his work on the ape shows that the vaccine conferred almost complete resistance. He then began its application to humans, using it in the first instance only on children born of tuberculous mothers and later on new-born babies generally. The entire period from 1908 to 1924—16 years—was confined to experimentation on animals.

Since 1924 the vaccine has been used very largely in France and in some other parts of Europe in the vaccination of children. Up to the present time some 116,000 children have been vaccinated in France alone, these children being under the observation of the leading clinicians of the country. So far as I am aware, these clinicians are unanimous that BCG is innocuous.

Last year Mr. Lignieres, a veterinarian from the Argentine Republic, raised the question of the innocuity of this vaccine, citing the cases of two children, one of whom had been vaccinated and the other had acquired tuberculosis. Mr. Lignieres claimed that the vaccinated child had developed tuberculosis from BCG and had communicated it to the other. Professor Calmette obtained cultures from these two cases, and after thorough examination affirmed that the bacillus was of human origin and therefore could not be BCG. The discussion that arose over

this, accompanied with other criticisms of Professor Calmette's work, caused him to refer the whole matter to the Health Committee of the League of Nations, asking that a study should be made of the results of vaccination with BCG against tuberculosis.

The Health Committee instructed its President to call an international conference of experienced men to take the whole matter under consideration for the purpose of evaluating the results of vaccination with BCG on laboratory animals, bovines and humans. I am enclosing herewith a copy of the official report by this conference, which has since been adopted by the Health Committee of the League of Nations. This conference was made up of some of the most distinguished scientists of Europe. Three committees were constituted, viz., a Committee of Bacteriologists, a Committee of Clinicians and a Committee of Veterinarians. You will find the conclusions of these Committees in the official report attached hereto, beginning on page three.

The Bacteriological Committee unanimously agreed that experimental results justify the conclusion that BCG is a harmless vaccine, one member of the Committee, Professor Nobel, however, maintaining that in *exceptional* conditions BCG is capable of developing fatal tuberculosis in *laboratory* animals.

The Committee of Clinicians were unanimous in their judgment (see page 4):

1. That BCG administered by mouth to infants within the first ten days of life and by subcutaneous innoculation in other children and in adults is incapable of producing virulent tuberculosis lesions.
2. That in regard to immunizing properties, BCG produces a certain degree of immunity.

The Committee of Veterinarians, the conclusions of which are on page 5, were unanimously of the opinion:

1. That vaccination by BCG was perfectly innocuous,
2. That the vaccine possesses immunizing properties against experimental and natural tuberculosis infection.

They therefore recommend, in view of the encouraging results obtained, that this work should be carried out in all countries according to a definitely organized scheme.

The Associate Committee on Tuberculosis of the National Research Council at its meeting did not pass judgment at all on the question of the vaccination of children. We had, indeed, before us the facts with regard to what had been done in France. We had also before us the

cases of 700 children vaccinated in Montreal by Dr. Beaudoin without a single untoward incident having occurred, this work being done last year without any assistance from the Council, Dr. Beaudoin working under direction from the Pasteur Institute. We nevertheless considered it wise to leave the whole question of the advisability of the vaccination of children to the medical profession.

With regard to bovines, it was definitely decided to carry out a series of experiments along the lines suggested by the Committee of Veterinarians of the Health Committee of the League of Nations, and a subcommittee was appointed to arrange the programme to be followed, the exact decision, as moved by Dr. Savage and seconded by Dr. Hilton, being as follows: "That this Committee approve putting into action a plan such as that outlined by the International Commission on BCG".

Dr. Watson has doubtless informed you that some of his findings are not in accord with the findings of the international conference called by the League of Nations. On the other hand, the work done under Dr. Allan Rankin in the University of Alberta on bovines is completely in accord with the findings of the League of Nations Committee, both with regard to the innocuity of the vaccine and its resistance-conferring power. The main difference between Dr. Rankin's experiments on immunity and Dr. Watson's experiments is that Dr. Rankin protected his young calves from contact with tuberculosis for two months after vaccination, feeding them on pasteurized milk, while Dr. Watson's animals were immediately exposed to infection. It would appear from these results that a protective period following vaccination is necessary. Dr. Rankin was the first to sense the significance of this fact. Professor Calmette now recommends that such a period be observed in all work on animals.

. . . The fact, however, cannot be denied that, after years of world-wide research on the prevention and cure of tuberculosis, BCG holds out the only hope that science yet sees of early success in conquering this scourge. I think anyone acquainted with the literature on the subject will agree that, so far as the innocuity of the vaccine is concerned, its position today is fully as favourable as that of smallpox vaccine. The real question to be decided is whether it confers a sufficient degree of immunity to warrant its general use on humans and bovines. That is the problem which further research alone can solve.

One word more, Calmette has some opponents, it is true, but they are neither so numerous nor is their evidence so convincing as the opposition encountered by Jenner and Pasteur when they announced

their epoch-making discoveries. It seems of the utmost importance, therefore, that every investigator should keep an open mind on the question of the value of BCG and should endeavour to determine with the least possible delay whether or not it constitutes another great forward step in the science of preventive medicine.

RELATIONS WITH GOVERNMENT DEPARTMENTS

TO H. M. TORY FROM W. A. MACLEOD, WINNIPEG, 3 JAN. 1928

I am enclosing you a report by Mr. Cairns on the Rust Research Laboratory here. I wonder whether the solution of this would not be to have all this research work under the direction of the Canadian Research Council. Would not this be an opportune time for making the shift?

This is merely a suggestion, but it would seem a great pity if these men were to leave and the work they have started be dropped, or taken up by men who have not been in touch with the research work carried on. Why should not all research work of this kind be carried on under the direction of the National Research Council with a decent appropriation and cut off from the routine of the Civil Service which is not well adapted for controlling work of this kind?

CONTINUANCE OF INVALUABLE RUST RESEARCH IMPERILED

The welfare of many wheat farmers in Western Canada is jeopardized due to the imminent danger of scientists, who have made invaluable contributions to the solution of the rust problem, leaving the country because the Dominion Department of Agriculture will not pay them sufficient salaries.

In two years a small group of scientists working at the Dominion Rust Research Laboratory, have achieved many results of immense practicable importance and have made scientific discoveries which have been heralded throughout the scientific world as the greatest advances in plant pathology during the present century.

Very substantial progress has been made in evolving by plant breeding wheat types of acceptable milling and baking qualities which possess the power to ward off the attacks of stem rust. J. R. Craigie, one of the members of the laboratory staff, has solved a riddle which has puzzled

plant scientists for several decades—he has conclusively demonstrated the existence of sex in rust and shown the great possibilities of producing new forms or strains of rust by one form crossing with another. Yet these scientists, who have spent from eight to twelve of the most valuable years of their lives obtaining a thorough training in research, all at their own expense, have been working and are asked to continue to work for the paltry sum of considerably less than three thousand dollars per year. Most of the members of the laboratory staff have attractive opportunities to leave and unless action is taken in the very near future only one thing can happen—a break in the continuity of the valuable work now being done and the marking of time until Canadians come to appreciate the value of scientific work and are willing to pay salaries commensurate with those paid by institutions and private concerns competing for highly trained scientists in Canada and the United States. . . .

TO THE HON. JAMES MALCOLM FROM S. P. EAGLESON, OTTAWA, 13 FEB. 1928

. . . relating to the Dominion Rust Laboratory at Winnipeg.

The facts of the case are as follows: The National Research Council, in cooperation with the Federal Department of Agriculture, the University of Alberta, the University of Saskatchewan, and the University of Manitoba, is carrying on a concentrated, cooperative attack on the many problems of grain rust. This cooperative investigation is under the general direction of the National Research Council through its Associate Committee on Cereal Rust, on which each of the above named organizations has representation.

In connection with this investigation the National Research Council is financially assisting the groups of investigators who are working on this problem in the three prairie universities and the universities also contribute to the work through the provision of laboratory accommodation, all ordinary equipment and expert direction for the investigation.

As part of this cooperative investigation, the Federal Department of Agriculture has established the "Dominion Rust Laboratory" at Winnipeg, which Laboratory is financed by, and is under the jurisdiction of, the above Department. The work of the Laboratory is thoroughly coordinated with the researches carried on by the other groups of investigators working under the Associate Committee of the Research Council on Cereal Rust. It is obvious, however, that any inquiry for detailed information regarding the staff of the Dominion Rust Laboratory should be addressed to the Department of Agriculture. . . .

TO THE HON. J. E. BROWNLEE (PRIME MINISTER OF ALBERTA) FROM H. M. TORY, EDMONTON, 10 JULY 1928

This is just a little note to tell you that a few days ago an Order in Council was passed placing at the disposal of the Research Council $219,000, the accumulation of two years' overages in connection with the operation of the elevators. This means that we will be able to greatly extend our work in grain research in Western Canada, just as soon as we can create the necessary organization. This is the nicest thing that has happened to our research programme for a long time.

Our present Minister of Trade and Commerce is a most satisfactory and decisive man to deal with. Once his mind is made up there is no delay about action.

I thought you would be interested in knowing the facts about this, as it puts a new face on our grain research work for Western Canada.

TO F. H. AULD (DEPUTY MINISTER OF AGRICULTURE FOR SASKATCHEWAN) FROM F. E. LATHE, OTTAWA, 6 OCT. 1928

. . . I was particularly interested to learn of the comments made by Mr. Arkell* upon our investigation of wool growing. . . .

Since the criticisms which you mention were made by an official of the Dominion Department of Agriculture, I think you should know that the attitude of that department towards the Research Council has not in all cases been what we could wish. We have under way a number of cooperative researches which are nominally shared by the Department of Agriculture and the Research Council. I regret to say, however, that most of the cooperation is on our side alone. This is true to a considerable extent of all the work which we have undertaken jointly. . . . Dr. Grisdale mentioned at one of our Council meetings that the men of his department had taken offence at an article written by Dr. Tory regarding the work of the Research Council because sufficient acknowledgment had not been made of the cooperation of the Department of Agriculture. When we looked up the article in question we found that they had been given all the credit which any organization could reasonably ask for. This led to an investigation of the acknowledgment which they had made of our cooperation with them. We found upon examination of their official reports that in the vast majority of cases they had

*Mr. H. S. Arkell, Live Stock Commissioner, Live Stock Branch, Department of Agriculture.—M.W.T.

not mentioned the National Research Council in any way whatsoever, leading the public to believe that the work done was entirely their own. We did succeed in finding one instance where we referred to work which was being done jointly and did not mention them, but such an oversight will occasionally occur in spite of every effort to give due acknowledgment. To show you how we handle a matter of this kind I am enclosing a copy of our last Annual Report, which you will see makes repeated acknowledgment of the cooperation of the Department of Agriculture, of the universities and other organizations.

You will understand from the above that we feel that the criticisms of the Department of Agriculture may to some extent be an attempt to discredit the work which we are doing in the eyes of responsible officials throughout Canada. We do not like to even suggest that they could be actuated by such feelings, but unfortunately there is considerable evidence in that direction. . . .

TO F. E. LATHE FROM F. H. AULD, WINNIPEG, 10 OCT. 1928

I received your letter yesterday in Regina and shall write you shortly re sheep lands. In reference to the wool research, I think that there is not a great necessity of being discouraged or even surprised at the comment of Arkell, whose judgment is not *always* supported unanimously, nor is there any reason to be surprised that research workers are not all jubilant over the activities of the Council. Their attitude is to be expected as I find Civil Servants at Ottawa are largely disposed to regard Canada as created chiefly and primarily to afford scope to their administrative genius. To have therefore a parvenu! organization interfering in their domain is to be under their criticism and one would have to be as wise as the proverbial serpent in order to counteract it. So let not your sleep pass from you or your countenance fall.

RELATIONS WITH UNIVERSITIES

TO HUME CRONYN FROM H. M. TORY, EDMONTON, 11 FEB. 1928

. . . Evidently, Mr. Bennett is confusing completely the action of the Interior Department in connection with the pulp and paper laboratories in Montreal with the Research Council. As a matter of fact, the Research

Council has nothing whatever to do with the situation in Montreal. The facts are these.

McGill University entered into an arrangement with a pulp and paper organization by which they were to build a laboratory at McGill University, the pure science part of which was to be under the direction of the University through Dr. Hibbert. It seems that the pulp and paper people did not raise enough money so McGill had to put up $75,000 to finish the building and, in addition, to provide the land upon which the building is built. With regard to the practical work in pulp and paper, that was to be under the direction of certain officers of the Interior Department, Forestry Division. Now, it seems Currie did not complete his contract concerning the managerial arrangements until after the building was put up. In the meantime, Dr. Hibbert, who is a very able man but exceedingly difficult, gets into a quarrel with the Interior Department. I should not be surprised if they sought the quarrel on purpose.

Now to come down to the scheme for fundamental research in the laboratories under the control not of McGill University but of the officers of the Interior Department. This action on the part of the Interior Department is a deliberate action to steal some of the work which otherwise would be done by our National Research Laboratories. As you know, Cory was determined to bring the whole of the pulp and paper work back to Ottawa but the McGill authorities persuaded Stewart to leave the paper mill and the research work there. My point, however, is that we have had nothing whatever to do with it. We are not in conflict with McGill University and I have no doubt the Interior Department are aiming at us as well as at McGill. . . .

TO SIR ARTHUR CURRIE FROM H. M. TORY, OTTAWA, 7 FEB. 1928

. . . Now, with regard to the general situation, I have given fairly long and careful study to this whole question of the relation of universities to industrial work and also to the question of what the university can expect in the way of assistance from the central government. I know that there have been a few who thought that all the work that was being done by the Research Council should be done in the universities and at one time members of some of the universities so expressed themselves to members of the government. I did not take a place in the Research Council until I was convinced that cooperation in the sense of handing over to the universities to carry on all industrial research cannot be accomplished. To begin with, governments will not give money exten-

sively to institutions which they do not control. When you express the opinion that it is strange that the government is willing to spend millions of money on institutions at Ottawa and not willing to give equipment to McGill, it seems to me you are losing sight of one of the fundamental things that are associated with government organizations. All state universities, although their boards of governors are appointed and controlled by the government, only one step removed from their direction and influence, are still struggling with the problem of necessary funds to carry on anything but the most elementary teaching work, simply because government officers who have control to a certain extent of the amount of money voted are always watching to prevent anything being done that could have the slightest appearance of conflicting with their own ambitions.

The only way the Dominion Government, up to the present moment, has made any grants has been through the National Research Council and the grants there up to date have been exceedingly small. When I became President of the Research Council, it had reached a stage when the Government's opposition to it, expressed through its officials, was on the point of putting it completely out of business; simply because ordinary routine government authorities did not control the expenditure of the small sum of money available. These men are in constant contact with the ministers and are constantly dropping into their ears suggestions which often unconsciously have their effect. . . .

Universities and Industrial Research

. . . I think the recent statement made by Sir Ernest Rutherford on the subject, than whom no person is better entitled in the English speaking world to speak, summarizes the whole situation. He says:

Since the War there has been a notable increase in the number of scientific men who are engaged either in fundamental research or in applied research with special reference to industrial problems. The question thus naturally arises as to the nature of the research work that should be carried out in a laboratory like this. Should the spare time of its teachers and research students be devoted to investigations on the fundamental problems of physics, quite apart from any question of immediate practical bearing, or to researches of a character likely to be useful in industry? This is an important question, but I should unhesitatingly say that our pure science laboratories should in the main be set aside for fundamental research. Apart from the interest and importance of adding to our knowledge of the processes of nature, experience has shown that discoveries of the greatest significance to mankind, whether in the practical or intellectual sphere, are generally the outcome of fundamental research undertaken purely with the aim of adding

to knowledge. Industrial research should be undertaken by manufacturers or the government in special laboratories where the research workers can come into close contact with manufacturing conditions. This does not exclude the desirability of occasionally conducting applied researches in university laboratories, especially where one or more of the staff may have a special knowledge of the problems involved. In general, however, I should view as an unmitigated disaster the utilization of our university laboratories mainly for research bearing on industry.

My feeling is that if it were not for the fact that the industrial competition of today makes the question of industrial education and research a national problem we should say to the industrialists, you must do your own work and pay for it.

I would never permit a university over which I presided being made a fifth wheel to an industrial coach. Our work after all is teaching and research. That is the reason why I am now backing the development of a Research Institute which will deal primarily with industrial problems. The question is a national one: it belongs to the national government or to the industrial organizations or both, jointly. They should pay the bill and not call upon funds, either capital or current, of universities for the purpose.

I think the ambition that is now being expressed both in McGill and Toronto to have industrial research centralized around the university is a mistaken one, destined, if it were fulfilled, to lead to intellectual disaster. If the plans that I have made are carried out the Research Council will be throwing its weight behind the development of research schools in the universities for pure research but will, as far as possible, make it unnecessary for them to undertake the more purely technical aspects of industrial requirements.

TO H. M. TORY FROM C. J. MACKENZIE, SASKATOON, 31 JAN. 1928

With reference to your letter of January 19th. Dr. Thorvaldson has no doubt informed you that the discussion which we incorporated in our annual report to the Engineering Institutc was an account of work done during the past six years and not, as you thought, of work done during the past months on funds granted directly to Dr. Thorvaldson. You will also find that the last grant only of your Council was made to Dr. Thorvaldson, all previous ones having been made to our Committee although we all recognizc that the last grant to our Committee was made due to your confidence in Dr. Thorvaldson's work. . . .

You likely have nevcr been informed about the early history of our Committee which I shall set down briefly.

In 1920 I was personally engaged in some tests of alkali waters on concrete and, realizing the importance and magnitude of the work, I approached the Research Council to take this work over. They replied that if the different parties interested would unite under a Committee of the Engineering Institute and solicit funds for a co-operative research, they, the Research Council, would assist. Our Committee of the Institute thus came into being.

The following funds have been raised and spent:

Research Council	$20,000.00
Canada Cement Co.	11,997.00
University of Saskatchewan	9,000.00
Alberta	2,000.00
C.P.R.	3,000.00
City of Winnipeg	700.00
Interest	1,124.93
	$47,821.93

In addition to these funds the University of Saskatchewan has probably contributed indirectly another $10,000 as Dr. Thorvaldson has been largely relieved of teaching duties and several other men in the chemical and engineering laboratories who are on the University payroll have been doing work for several years on various phases of the subject.

At the present time the problem stands as follows: A great deal of work has been done, methods devised, equipment built, and results obtained which the engineers of the west feel is of immense practical value, but we feel that if the full effect of this research is to be obtained, further work must be done to tie in the laboratory findings with practice. On the other hand, now that your Council has adopted the policy of making grants directly to Dr. Thorvaldson I find it very difficult to determine the various rights of the parties who contributed to the common funds, as many long-time tests are in operation, the results of which will be available in the future.

As our Committee funds approach depletion I have been turning over in my mind a suitable and satisfactory method of getting out of the rather indefinite and awkward arrangement. I have taken the view that the Research Council is the logical and desirable body to take over the work, and I have made no attempt to raise further funds from outside, although after the meeting of the Calgary Branch of the Institute which I addressed recently and outlined the great practical worth of the research several engineers expressed the opinion that in the light of what we have

done that it would be easy to raise further funds from their companies. However, I personally have no desire to continue the work under the present committee. Your recent suggestion to me that a sub-committee of the Research Council might be formed to take over the work appealed to me and I suggested to the recent meeting of our Committee and also at the Calgary meeting of the Institute that it might be a wise step to approach your Council with that request. It occurred to me that when I go to Montreal in February for the annual meeting of the Institute, I might so negotiate matters that a request would come from the Institute to your Council to take this work over and if such could be done I would be very pleased and there would be no grounds for misunderstandings as to future publications, etc.

If such an arrangement cannot be negotiated and I suggest that the most satisfactory way is for the request to come from the Institute to your Council, then I will find myself in a very difficult position for, as Chairman of a General Committee of the Engineering Institute which has raised funds from various sources, I have definite responsibilities. In my official capacity I am in duty bound to object to your contention that all future publications of Dr. Thorvaldson belong to your Council (although of course no suggestion is made that the work done on the personal grant from your Council does not belong entirely to your Council), due to the fact that he has received and used to date monies granted to him personally. Many of the experiments started on the Committee funds of $47,000 will not be reported for some time, and I have no authority to sell or give away any interests which the contributors of over half the funds spent may feel in the future reports of long-time experiments started on committee funds. If I were approached by any other of the major contributors, such as the Canada Cement Company or the University of Saskatchewan, on a similar proposition my answer would have to be the same.

I wish that you would give this matter your careful consideration and advise me as to what course seems advisable to you.

I do hope that you will bear in mind that it is my most sincere wish that the Research Council should obtain all of the credit possible out of this work, that we are not after credit for work, that I would be very relieved indeed personally to have the work of our Committee wound up, and that if you approve of the method suggested I will do everything in my power to bring it about in a diplomatic and effective way.*

*This was done, exactly as Mackenzie planned.—M.W.T.

TO S. P. EAGLESON FROM WILLIAM D. TAIT (MCGILL UNIVERSITY), MONTREAL, 22 FEB. 1928

I thank you for your prompt reply to my letter of the 15th instant and I may say that your answer was fully anticipated. It was my intention to bring the matter to an issue by writing. . . .

Psychology is now ranked as one of the sciences and as one of the biological sciences. There is no doubt on that point. Anyone who has followed its application in industry will be reluctant to deny that it has important economic results. . . . Some research in this field would appear to be not only promising but also necessary.

Psychology is now included in the B.A.A.S. and the A.A.A.S. One of the last Presidents of the A.A.A.S. was Dr. Cattell, a psychologist, and most publishing houses today list psychology among the sciences. Members of your committee are no doubt familiar with the viewpoint of Bertrand Russell who places psychology on a par with physics if not superior. I submit that the opinion of a man like Russell cannot be ignored.

I would further point out that many members of your committee periodically lament the fact that Canadian brains are being exported to U.S.A. Yet what are they doing to prevent it? Two McGill graduates in psychology have held scholarships from the National Council in U.S.A. of $2,000 and $1,800 respectively. The present holder is investigating racial differences among European peoples,—a very important matter from the Canadian aspect in view of our interest in immigration. Do you not think that such a matter is more vital than an investigation about mosquitoes in B.C. or about the spermatozoa of bulls?

I shall appreciate it very much if you will bring this matter to the earnest attention of your committee with the hopes that something may be done about "Humanity in Industry" to use the Premier's apt phrase.

TO WILLIAM D. TAIT FROM H. M. TORY, EDMONTON, 6 MARCH 1928

Mr. Eagleson has sent me copies of the correspondence which he has had with you over the question of psychological scholarships. I am especially interested in the letter of February 22nd.

You will pardon me if I say that neither the tone nor the content of your letter is such as I consider we have the right to expect from a man holding your position. You have apparently glanced at one of the reports

of the Research Council and deemed it wise to refer to one or two items, omitting reference to the comprehensive scheme under which the Research Council is operating. As a matter of fact, no application to my knowledge from any psychologist in Canada, has come to us, nor has any argument ever been submitted excepting one from Professor MacEachran of the University of Alberta who desired a grant for a research in connection with a specific educational problem on the methods of teaching arithmetic. The members of the Research Council are not quite so ignorant of the movements in modern psychology as your letter would seem to hint and I think most of them are quite familiar with the views of Bertrand Russell.

I would suggest, if you desire a scholarship for specific study, that you make application as other people have done and that you present a reasoned argument omitting offensive suggestions.

TO PROFESSOR T. L. WALKER (UNIVERSITY OF TORONTO) FROM S. P. EAGLESON, OTTAWA, 23 APRIL 1928

. . . If it were possible for the Council to grant an unlimited number of scholarships, there would be some ground for your feeling that the Council had lightly regarded your testimonial in support of ——'s application. When you consider, however, as Dr. Mackenzie, president of Dalhousie University, who is Chairman of our Scholarships Committee, has asked me to explain to you, that there were approximately twice as many applications for scholarships received as there were awards available, it must be obvious to you that approximately one-half of the applicants had to be refused awards, and consequently one half of the professors who recommended applicants are now in exactly the same position as you are in this matter. Moreover, this situation has obtained for many years past, and in the eleven years' history of these scholarships, no professor has ever previously felt that the failure of a student whom he recommended to receive an award was in any way a reflection on his judgment. . . .

TO C. F. MARTIN (ACTING PRINCIPAL, MCGILL UNIVERSITY) FROM H. M. TORY, OTTAWA, 2 NOV. 1928

. . . My judgment is that the weakest part of our whole university system in Canada today is in our graduate work. We train a great body of men in undergraduate courses of an excellent quality, and because we have no graduate schools worthy of the name, we allow other countries

to take away our choicest men and train them for their own services. I would hope that in the effort to straighten this out, McGill, instead of being fearful of the National Research Council's work, would join with us in helping to remove what I regard as a stigma upon our universities.

RELATIONS WITH INDUSTRY

TO THE HON. JAMES MALCOLM FROM G. M. CARRIE (WILSON, PATTERSON, GIFFORD LTD., SCOTTISH CANADIAN MAGNESITE CO. LTD., AND NORTH AMERICAN MAGNESITE PRODUCTS LTD., GRENVILLE, QUEBEC), 23 JAN. 1928

Following our recent conversation in Ottawa, we would like to formally convey to you, and to the National Research Council, our sincere appreciation of the assistance we are receiving in the solution of some of the problems which confront us in the development of our particular branch of industry. As a result of the work that has been done during the past three years we would like to emphasize the following points.

After the war the Magnesite interests found themselves with a so-called lower grade material, or a material different in composition to what has been regarded as standard. There had been a ready sale for this during the war when the Austrian source of supply was cut off, but as conditions became normal it became very difficult to find a market for the Canadian material. After struggling with the problem for several years, the Government was approached for assistance, and finally an appropriation was arranged so that the National Research Council should do some work with a view to finding out what could be done with the raw materials which were available. After three years' work, during which time the National Research Council have taken a large share of the burden of Research and investigation, the result has been that from the so-called lower grade of raw material a product is being produced which is better in actual performance than what was originally considered the standard refractory for use in open hearth steel furnaces.

This result is encouraging, and is an indication of the value of Research. There is a very great need for further investigation of the problems of the steel manufacturer in so far as refractories are concerned, and we are grateful for your assurance that the investigation of these problems will be continued until we are able, through the development of better basic refractories, to materially assist the steel manufac-

turers by overcoming one of the greatest handicaps to efficient operation of steel furnaces.

The Canadian market is being almost completely supplied with Canadian Magnesite, and a growing export market is being developed in Great Britain and the United States especially. Thus one of the natural resources of the country is being developed, and the large part of the growth will be along export lines. This result has been largely due to the assistance received from the National Research Council.

It is very gratifying to find the authorities so thoroughly appreciative of the value of research in the utilization of our natural resources, but it is only natural that the Government should assist in this work as the progress of Industry naturally benefits the whole country if it is built on a sound basis. Other countries have realized the necessity for research and Canada must not be allowed to fall behind.

TO H. M. TORY FROM J. T. STIRRETT (CANADIAN MANUFACTURERS' ASSOCIATION), TORONTO, 30 JAN. 1928

I am instructed to forward the following extract from the report of the Executive Committee, which was unanimously approved at the meeting of the Executive Council of the Canadian Manufacturers' Association at Hamilton, Ont., January 29th., 1928.

SCIENTIFIC AND INDUSTRIAL RESEARCH

"The progress of Scientific and Industrial Research in Canada since 1916 was described in the report of the Education Committee to the Annual General Meeting at Calgary, last June.

"At the last session the Parliament of Canada increased the research grant to $170,000. In speaking in favour of the increase, the Honourable Mr. Malcolm, Minister of Trade and Commerce, said in the House,— 'This is one of the most important items in the whole Department of Trade and Commerce. It affects all parts of Canada, and is of interest to every Canadian who is anxious to see his country develop. It is the avowed policy of the Government to prepare plans during the coming year and bring down at the next session a considerable vote to enlarge the work to an extent which heretofore has not been contemplated.' . . .

"Your Committee recommends that the Association continue its policy of supporting every practical effort in aid of Scientific and Industrial Research, and, especially, urge the approval and support of the recommendations of the Minister of Trade and Commerce at the present session of Parliament." . . .

TO H. M. TORY FROM THE HON. JAMES MALCOLM, OTTAWA, 30 JAN. 1928

. . . I had a talk with Gordon Gale* today regarding the question of using an Arc boiler for generating steam. It is a disappointment to learn from Mr. Gale that my hope as to this being a possibility is not confirmed by him. He has given very careful study to this whole question and points out that only where one can get full use of the steam for at least 8000 hours per year and where electric energy can be supplied at somewhere about $6.00 per H.P. is the method feasible. You will recall that I had thought it might be possible that the power companies would like to encourage the use of current for this purpose, but Mr. Gale's statement to me is that they only are using current for producing steam themselves because they have a surplus and that it is possibly the poorest paying sales they can make.

However, our conversation led into the other channel,—that is the cooperation from industrialists and engineers in our work, and in this regard I think I have made some considerable headway. Mr. Gale is interested of course that our laboratory should have charge of the work of standards. He intimated to me that we may and probably will, run into the Hydro Electric of Ontario, who are anxious to have this work done in Toronto. His company of course is selling a big block of power to the Hydro and for this reason they are unable officially, to say very much, but as an independent power company, will support us in having this work done here.

Rest assured that insofar as I am able, in my private contacts, to build up friendship and cooperation which will be needed in our work, I will do so.

Do not forget that I am counting on you to give me as many data as you can between now and the time the Estimates are up, so that I may intelligently discuss this matter.

With very kindest regards.

TO F. E. LATHE FROM D. N. PANABAKER (R. FORBES COMPANY, LIMITED), HESPELER, ONT., 3 MAY 1928

. . . There is no doubt that the water now being used by the larger woolen manufacturers in Canada is very superior to any raw water that

*Vice-President and General Manager, Gatineau Power Co.; later President, E. B. Eddy Paper Co., etc. etc.—M.W.T.

is available anywhere and we do not believe that any time need be taken up by the research committee in this connection.

The matter of artificially humidifying the air in textile manufacturing plants is one that possibly would be deserving of further research but this field also has been rather extensively covered. . . .

Frankly, I see little hope of an outside organization, lacking the facilities and also somewhat unfamiliar with the best practices in manufacturing, accomplishing very much in a practical way in the matter of improvements in mechanical equipment, and I think that this can be safely left to the manufacturers of such equipment, who are more closely in touch with objects to be sought. . . .

TO H. M. TORY FROM F. E. LATHE, OTTAWA, 8 MAY 1928

I am enclosing a copy of a letter just received from Mr. Panabaker regarding problems in wool manufacture. . . .

I am sorry that the manufacturers do not appear to be ready to state the nature of their problems. The difficulty to my mind is that they think the chief problems are in wool growing and that their own work is about as efficient as can be expected. Until there is some change in that attitude I see no great hope of our helping them. I am inclined to think that this idea should be brought home to them. . . .

TO H. M. TORY FROM F. E. LATHE, OTTAWA, 5 MAY 1928

As requested in your letter of April 26th I attended the Fire Hose Convention on May 3rd. . . .

One of the delegates at the conference asked where the Committee would hold its meetings and stated that this might have a good deal to do with the representation of his organization, since they would wish to keep travelling expenses at a minimum. I am inclined to think that at times the necessity of paying their own travelling expenses interferes with the attendance of members at the meetings and it may be worth considering whether the National Research Council should pay all such expenses, either under the present system or some modification of it.

. . . The report was ready for distribution about a year ago but British Columbia representatives express themselves very strongly against its distribution since wooden shingles were rated very low on the list of fire-resisting roofing materials. There was some very warm discussion on this subject, which finally ended by the Committee agreeing to a limited distribution over the protest of the British Columbia delegates. Mr. Smith

thought we would be particularly interested since the question involved was practically that of the right of a government department to carry out a technical investigation and make public the results without fear or favour.

RELATIONS WITH THE PRESS

UNDATED CLIPPING FROM THE FINANCIAL POST

Second thoughts on the recent news from Ottawa that Hon. James Malcolm, Minister of Trade and Commerce, intends to go ahead with a national effort at research and standardization lead to the belief that results can be achieved by such a work far beyond the present ambitions or aspirations of Canadian business men. It is fortunate that such a level-headed, aggressive type of individual as Mr. Malcolm will have in charge the handling of this great national project for it is certain to be conducted under his jurisdiction, with a practical as well as a progressive touch.

Canada is not without research work at the present time, Ottawa points out that sixty-odd researches are now being carried out on a co-operative or other basis with the National Research Council taking the lead. Some of these have been detailed. It is a good thing that the publicity men in Mr. Malcolm's department have brought these to the light, for, as the Financial Post has previously charged, the Research Council is a somewhat cloistered body that has not sold itself to the public nor won public interest in its work. The result of its shyness has been that expenditures upon research have been regarded by many people as somewhat wasteful donations to a purely academic work of doubtful value.

Plans will likely be announced by Ottawa shortly, outlining its plans in research work, but it is apparent that they will include the establishment of laboratories. It is pointed out that while pure science must be pretty well left to the universities, it is the aim of the government to coordinate all the forces now engaged in industrial and scientific research under one common aim, with a system of laboratories as the national brain of the direction of the entire activity. It is the desire to concentrate present earnest, but more or less haphazard endeavor under one head, to bring about uniform activity and effort, and to eliminate so far as possible wasteful duplication. The men and the brains are available. The Research Council has effected an aggressive co-operative system. It is

now proposed that there shall be established a national institution, thoroughly equipped and efficiently manned, whereby all effort shall be focused on one aim.

TO H. M. TORY FROM F. M. CLEMENT (UNIVERSITY OF BRITISH COLUMBIA), VANCOUVER, 5 APRIL 1928

We have a letter from the Agent General for British Columbia in London, England, asking for information for the press with regard to our work on Bacillary White Diarrhoea in Poultry which investigation as you know, has been made possible by funds granted by the National Research Council. . . .

TO F. M. CLEMENT FROM H. M. TORY, EDMONTON, 17 APRIL 1928

. . . in making public statements be conservative in what you say so that there can be no come-back upon us later.

1929

"We oversimplify the theses of our forerunners in order to credit ourselves with putting in the fine touches."
—Jean Rostand, 1962

"We may affirm absolutely that nothing great in the world has been accomplished without passion."—Hegel

"Whoever tries for great objects must suffer something."
—Plutarch

THE PROPOSED LABORATORY BUILDING on Sussex Drive provided some amusement, when the architect stood so in awe of the Prime Minister that he took Mackenzie King's naked word as sufficient warrant to upset an Order-in-Council.* This building was still in the planning stage but, in the meantime, laboratory work was proceeding in renovated lumber buildings on John Street. The first directors were appointed: R. W. Boyle as Director of the Department of Physics and Engineering Physics, with J. H. Parkin as Assistant Director; and G. S. Whitby as Director of the Department of Industrial Chemistry. Two more professional divisions were established during the year: Biology and Agriculture, and Research Information.

The National Research Council issued Volume One, Number One, of the *Canadian Journal of Research* in May 1929, at a subscription of $3.00 for one year.

In 1929 the Government authorized the National Research Council to undertake investigation of the smoke damage which it was alleged was being done in the State of Washington by the Trail

*Document quoted in this volume.

Smelters situated in British Columbia. The authorization was given by the Committee of the Privy Council at the request both of the Department of External Affairs and of the International Joint Commission.

The McGill authorities stopped polishing the sword reserved for Macallum and Ruttan and thrust it home in the shape of a letter to Malcolm, saying that they did not care to be represented on the National Research Council by professors who had, in fact, retired.* This was a little rough on Macallum, who had come to the NRC from the University of Toronto.*

When the blow fell, Ruttan apparently took it quietly. Macallum acted as though he had been cast out of Heaven itself. For instance, since it was clear that Tory intended to cling to his dual role as chairman of the Council and also executive head of the laboratories, Macallum flings it at him that the words "for the present" had been forced on Tory by the Council in 1927, and that this phrase was intended to mean "only for two or three years,"* two years of which had now gone by.

Tory was a master of verbal sword play—but Macallum was a grand master; Tory did not match the poetry, the fire and passion with which he was attacked and had to content himself merely with being right much more often than Macallum.

Tory said that Macallum had autocratically made the Council into a self-perpetuating body, and that this was illegal. Both statements are entirely correct. Tory went on to say that any excuse for this behaviour that might lie in the fact that the Committee of the Privy Council "did not meet" had now been done away, since, with laboratories in the building stage, they were holding regular meetings and "exercizing their responsibilities under the Act."* At Tory's suggestion,* the Minister of National Defence was added to the Committee, because so much of the Council's new work was being done for that department.

In the end, Tory won in the realm of brute fact. Because of his impregnable alliance with the future, he was unassailable by any foe in the world under the rank of Prime Minister and poor Macallum had no real chance against him. In one letter,* Macallum advocated a policy which would remove the defect of self-perpetu-

ating membership: he suggested that a member be eligible for a second three-year term, but that should be the end: no more than six years for any man. In point of fact this policy has been in effect vigorously since that date, with exceptions for a few men such as D. L. Thompson and C. J. Mackenzie. However wise this custom may be as a normal rule, it would be stupid to do without the rare Thompsons and Mackenzies when they happen to be available. The Council was wise enough not to be ridiculously virtuous.

DOCUMENTS

INTERNAL RELATIONS

TO HUME CRONYN FROM H. M. TORY, OTTAWA, 18 JUNE 1929

I submitted your letter [of resignation] last night to a meeting of the Committee of the Privy Council on Scientific and Industrial Research and explained to them the situation as far as you are concerned. There was a unanimous expression of appreciation of the work you have done in the past in connection with the National Research Council and an equally unanimous desire that you should allow your name to remain on the membership of the Council until after the laying of the corner stone of the new Laboratories. . . .

You will be glad to know that at last we have got an active Committee of the Privy Council at work, consisting of Mr. Malcolm, Chairman, Mr. Robb, Mr. Stewart, Mr. Motherwell, Mr. Ralston, Mr. Heenan and Dr. King. Further, this Committee has agreed to meet monthly to consider research problems and make suggestions to the Research Council. We have held two meetings, the second one being held last evening, at which all the members were present but one, Hon. Dr. King, who was out of town. At this meeting unanimous consent was given to immediately going forward with our plans for our new building. Plans and specifications will be ready not later than July 1st, and if the wish of the Committee of the Privy Council is carried out, tenders will then be called for the whole building, the cost of which will be approximately $2,500,000.

In the meantime, we are fitting up temporary laboratories in the Edwards buildings for Chemistry and Physics and commercial work and, in addition, are undertaking three large pieces of research in connection with aviation—(1) the building of a tank for flotation studies, (2) the building of a testing stand for testing the quality of airplane machinery, and (3) the development of a new wind tunnel on a much larger scale than that now available. This latter investigation, however, will not be undertaken until after the next session of Parliament. . . .

TO THE HON. JAMES MALCOLM FROM C. F. MARTIN (MCGILL UNIVERSITY), MONTREAL, 22 MAY 1929

For some years Dr. A. B. MacCallum and Dr. R. F. Ruttan have acted as members of the National Research Council and have in a certain sense represented the interests of McGill University in its deliberations.

In as much as both of these gentlemen have now retired from the active staff of the University it would seem only right that, should you desire to continue the practice of inviting University representation on your Council, such men should be selected from those who are actively engaged in the work of the University.

We do not wish to obtrude our views upon you, Sir, but it seemed only proper that you should be made acquainted with the changes that have recently occurred on our staff. With every expression of esteem, believe me . . .

TO H. M. TORY FROM THE HON. JAMES MALCOLM, OTTAWA, 29 MAY 1929

I have acknowledged the attached letter of Charles F. Martin and attach a copy of my reply.

I would suggest that you bring this matter to the attention of the Committee on Research at their next meeting, together with your own personal observations.

TO H. M. TORY FROM A. B. MACALLUM, LONDON, ONT., 15 SEPT. 1929

I know what "reaction" the letter enclosed herewith will call forth in you. It is sent to you nevertheless, after consideration extending over two months.

If that "reaction" is to be a permanent one and not to yield to one

leading to a change of policy and, consequently to right action on your part in Council matters, then to bring about a situation which will preserve for the Council its advisory functions, the accompanying letter will receive a wide publicity.

That the Council and you will be subjected to criticism within the next two or three years goes without saying. This may happen very soon. Just a couple of hours before leaving Ottawa after the March meeting of the Council I was greatly disconcerted when told that the expenditures of the Council would probably come before the Public Accounts Committee of the House of Commons at some early date. This made me anxious to prepare for possibilities and, in order to be certain that the expenditures for assisted research would pass muster wholly, I formulated for consideration and, if accepted, adoption by the Council at its next meeting a system of conditions which would in future prevent the slightest criticism of the Assisted Researches Committee. To be present at that meeting of the Council I had to give up a planned visit to South Africa to attend the meetings there of the British Association in July and August last, a visit that I looked forward to for over a year!

Had the question of my retirement been brought before the March meeting of Council and had only one or two members beside yourself suggested that I should make way for another appointee, I would have done so readily for I would then recognize that the Council had been allowed to function as I decided twelve years ago it should and I would have made my visit to South Africa.

Now after all my services of over twelve years and after the sacrifices I made in 1916–1920 my membership in the Council is summarily terminated and with not the slightest expression of appreciation of what I did in all those twelve years and only to get from you "Thanks" for my "co-operation" with you!!!

What heartless irony!

TO H. M. TORY FROM A. B. MACALLUM, LONDON, ONT., 15 SEPT. 1929

I received your letter of June 26th in which you informed me that at a meeting of the Committee of the Privy Council for Scientific and Industrial Research it was decided that I should not be reappointed a member of the National Research Council.

The reason for this decision is given by you: that, as the Committee decided, in order to keep the Research Council actively in touch with the Universities, it was necessary that appointments to its membership

should be made of those actively engaged in the work of the Universities, communications expressing that view having been received at various times from some of the Universities; in consequence the Committee determined to establish a definite policy in the matter, viz., that members of the Council retiring from the Universities, having reached the pension age, would not be eligible for reappointment on the expiration of their term of office. Under the ruling neither Dr. Ruttan nor I would be eligible for reappointment now, nor Dr. Adams whose term expires next year.

Before dealing with what personally concerns me in this statement, I will give attention to what in this involves the Research Council and yourself.

I have ascertained with considerable certainty that the Committee in this case, except in one minor matter, acted wholly according to your recommendations. These recommendations were not placed before the Research Council as they should have been and as the practice of the last eleven years required. You have, therefore, assumed powers that the Research Council Act of 1924 did not give you and above and beyond what you exercised from 1924 to 1929.

Membership in the National Research Council

The Research Council ever since and including 1918, until this year, has, when appointments to its membership had to be made, discussed the question of reappointments and when a member resigned from the Council the appointment of a suitable successor to him, and the recommendations of the Council in regard to these were accordingly approved by the Committee of the Privy Council. The very first vacancy occurred in 1918 through the resignation of Mr. T. Bienvenu. As Administrative Chairman at that time, I resolved, in order to keep the Council free from all political entanglements and from the operation of forces that might lessen its usefulness as an advisory body, that all appointments to its membership should be made only on the recommendation of the Council. . . . Sir George E. Foster, then Chairman of the Committee of the Privy Council, . . . expressed himself as in agreement with the view that appointments to vacancies in the membership of the Council should be made only on the recommendation of the Advisory Council whose function as an advisory body to the Committee should be exercised in this as in other lines, for the Committee could not know as the Council must know, who were the most qualified, possible appointees. . . .

That the Council should exercise an advisory function as to appointments to its membership is indicated by the practice of the British

Advisory Council for Scientific and Industrial Research and of the British Medical Research Council. When vacancies occur in these, through the terminations of the appointments thereto, the Council of each body is consulted and even the advice thereon of the Council of the Royal Society is sought. Recently Sir Alfred Ewing, the Emeritus Principal of the University of Edinburgh and pensioned by the University, was, on the advice of this origin, appointed a member of the British Research Council.

In acting as you did, in not getting the recommendation of the Council in the matter of the recent appointments to its membership you have absolutely run counter to the precedents and practice of the last twelve years.

Appointment as President

On an earlier occasion you ignored another function of the Council. In December 1916, when the Advisory Council was first constituted, it recommended to the Committee of the Privy Council what the salary of the Administrative Chairman should be. This recommendation was accepted by the Committee. From 1921 to 1927 the Council determined the appointments to the Acting Administrative Chairmanship and the honorarium attached to it. In 1927 without consultation with or any recommendation from the Research Council you had yourself appointed President of the Research Council for seven years, with a salary of $15,000. a year, a salary greater than that of a cabinet minister. Furthermore, in that appointment of seven years was included the appointment to the Directorship of the New National Research Institute, although at the 73rd meeting of the Council (held Oct. 11th and 12th, 1927) it was understood by members of the Council that the words of the resolution "for the present" sanctioning your appointment as Director, meant only for two or three years. . . .

The Council as an Advisory Body

You have, therefore, set at naught by your action the function of the Council in advising as to appointments to its membership and as to your own salary and if this is an indication of what you will hereafter do the Council as an advisory body, as its name would imply, will be but a figment of the imagination. In other words as one gentleman who knows the situation well put it, you "desire the Committee of the Privy Council to be your fountain pen and the Research Council to be your rubber stamp".

Will the public eventually have any confidence in the Research Council and the National Research Institute thus under your control?

Communications from Universities

You say that communications at various times were received (by you or by the Council?) from some of the Universities expressing the views that appointments to the membership of the Research Council should be made of those actively engaged in the work of the universities. This is one of your "artifacts" or, to put it in the parliamentary language used by the Rt. Hon. Winston Churchill on one occasion, it is "terminological inexactitude". If such communications were received why were they not brought before the Council for the consideration of them?

British Research Council

Of the twelve members of the British Research Council only four, or one-third of the total, are University Professors although there are fifteen Universities and of these Professors all have been selected for membership because of their outstanding achievement in science, not because of their University connection. Of the remaining members about an equal number are retired University teachers but these and all the rest of the members are recognized as of outstanding achievement and attainments in science.

Personal Considerations

Now I come to the solution as affects me personally. Had the question of my retirement because of my withdrawal from University teaching been discussed in the Council at its meeting in March last, I would, even if only a small minority of the members thought it to be the thing to do, voluntarily have signified my intention to retire from the membership, but by your action I was denied even that privilege. Dr. Ruttan told me before that meeting that he also was prepared to withdraw but he desired to see how you would act. He has seen!!!

I did not in any case intend to remain as a member of the Council one month after the formal opening of the National Research Institute. I would then have felt that I had done all that I should. There would then be achieved what I began to crusade for, the establishment of a National Research Institute, early in January 1917, first of all to persuade the Council, then Parliament and the public that it was necessary for the scientific side of industrial development in Canada. I had to campaign before Rotary clubs, Canadian Clubs, Manufacturers' Associations and other organizations to influence the public as to the urgency of this establishment. I had even to contend, in this campaign, against two universities because their Presidents held that all the research work required to advance the industries should be carried on in the Universities. Progress, though slow, in this crusade was made but in September

1918, the object aimed at was still unachieved and to achieve it I then refused an offer of a position the returns from which, had I accepted it would today have put me "on easy street". Early in 1919 the Government of that time decided to have a committee of the House of Commons appointed to consider and report on the subject. This Committee was appointed with Mr. Hume Cronyn, then a member of the House, as Chairman. This Committee gave earnest and extended attention to the matter and finally through Mr. Cronyn, whose service in it can never be adequately acknowledged, reported on May 7th, 1920 recommending the establishment of a National Research Institute for Canada. This report was unanimously adopted by the House of Commons after a discussion in which a number of members, including the Rt. Hon. Sir Geo. E. Foster, and the R. Hon. Mr. Mackenzie King and the Hon. A. K. MacLean, all fully approving of the report, participated.

When, therefore, in August 1920 the then Prime Minister, the Rt. Hon. Mr. Arthur Meighen, accepted on behalf of the Government the proposal to establish a National Research Institute, I felt that all that was required of me had been accomplished, and, in consequence I resigned the Administrative Chairmanship of the Research Council to accept the Professorship of Biochemistry in McGill, intending to resign from the Council itself in 1921.

That intention was not carried out, because on my return from China, where I was sent by the Rockefeller Foundation in 1921, I found that the Government Bill to establish the National Research Institute failed to receive the assent of the Senate. I had, consequently, to achieve the object of the efforts of the previous six years, to continue as a member of the Council.

Now I am dismissed from the membership of the Council by you, and not because as you allege, I have retired from active University work, but really because you desire to establish a domination of the Council which, if you succeed, will in a few years make that body consist wholly of nominees of your own and, in consequence, ready to accept your dictation in all matters coming before it.

In concluding I will refer to what in this affair you have done as a signal disservice to the Committee of the Privy Council. The members of this Committee could not have been aware of the part the Council played in the appointments to its membership in the past twelve years, for had they known there would have been, to put it mildly, a hesitation on their part in allowing you to act as you did without consulting the Council. From what I know personally of the Chairman of the Committee, the Hon. Mr. Malcolm, I cannot but believe that he wants always to do the right thing and that he would not have countenanced your

utter disregard of the Research Council before the Committee, had he been aware of the manner in which appointments to the membership in the Council had been made in the past. Now that the Committee has so acted it must in some measure excuse itself but will it in the future serve as your "fountain pen"! I cannot believe Mr. Malcolm will accept such a role.

TO A. B. MACALLUM FROM H. M. TORY, OTTAWA, 15 OCT. 1929

I regret exceedingly that your letter of September 15th has remained so long unanswered. It came at a time when I was incapacitated and forced to give up all work for a period of time. I returned to the office yesterday and have now had time to read and give consideration to the subject matter of your communication.

It is hardly necessary for me to say that I was amazed at the contents of your two letters, one of which was marked "personal". As the two letters deal with the same subject matter, I shall be compelled, in replying to them, to treat them as a unit, for it is only by taking them jointly that one can get your full point of view.

Before dealing with the statements in which you evidently intend reflections upon my personal integrity, I shall deal with the question of the personal grievance you consider you have against myself and the Committee of the Privy Council on Scientific and Industrial Research.

Reappointment

In your private letter you state that your membership in the Council has been "summarily terminated", and in the second paragraph on page 5 of your longer letter you use the expression "now I am dismissed from the membership of the council by you" etc. Both of these statements are wholly incorrect and misleading. You have apparently overlooked the fact that the term of your appointment as a member of the National Research Council expired on March 31st last. The question is therefore not one of dismissal from membership in the Council, as your letter implies, but simply whether, your term of office having expired, you should be reappointed for a further term. It seems to me rather remarkable that any member of a public body, whose term of office has expired, should claim reappointment as his right and feel aggrieved because a further term of office was not accorded him by the Government.

In this connection you charge that I have assumed certain powers not conferred on me by the Research Council Act. There is not the slightest justification for such a charge. Section 4(1) of the Research Council Act reads as follows: "The Council shall consist of not more than fifteen members who shall be appointed by the Governor in Council on the

recommendation of the Committee", and Section 2(a) of the Act reads: "'Committee' shall mean the Committee of the Privy Council on Scientific and Industrial Research." In both the original Act of 1916 and the Act of 1924 a clear distinction is made between the authority to be exercised by the National Research Council and the authority to be exercised by the Committee of the Privy Council, acting for the government. The Act specifically reserves to the Committee of the Privy Council the right of nominations to appointment to the Research Council, but having appointed the Council, it leaves a very large discretion to it, especially as set forth in Section 10 and subsequent sections, as to the way in which it shall conduct the Council's business. It ought to be obvious to anyone that the Council has no right to nominate its own personnel, unless especially asked to do so by the Committee of the Privy Council, and even if asked to advise, would have no right to assume that their advice would have to be accepted. It is consequently especially significant that throughout your letters you have not only ignored the above section of the Act, but so far as this particular instance is concerned, you have based your entire argument on the suggestion that Section 4(1) quoted above did not exist.

Precedents

You recite at great length certain precedents which you claim you established, with respect to the appointment of members of the National Research Council, and you succeed in showing that the Council has in the past considered the question of the filling of vacancies in its membership and has made nominations to the Minister with the result that there has not been a single instance in the history of the Council in which it failed to recommend the reappointment of existing members, unless a member had voluntarily retired. Obviously, no other result could be expected from such procedure, as members of the Council would naturally hesitate to oppose the reappointment of a colleague. By such procedure the Council would become a self-perpetuating body, contrary to the universal practice in the appointment of organizations responsible for the expenditure of public money.

You refer to the practice in Great Britain on this question, but you fail to mention the important fact that, in order to avoid this very difficulty, members of the Research Council of Great Britain are not eligible for reappointment when their term of office expires.

The sum and substance of your grievance in this connection appears from your letter to be that the Council was not "allowed to function as I decided twelve years ago it should". You also state that "As Administrative Chairman at the time, I resolved, in order to keep the Council

free from all political entanglements and from the operation of forces that might lessen its usefulnes as an advisory body, that all appointments to its membership should be made only on the recommendation of the Council." In my opinion, this was an assumption of autocratic authority on your part, and in direct violation of the act. You arrogated to yourself the right which the Act Reserves for the Privy Council Committee. Personally, I do not consider myself bound by such precedents.

There are two important reasons why the Council should not continue to follow the precedents which have been established in this connection. In the first place, I have already shown that these precedents are illegal, and in the second place, whatever justification may have existed for following them in the past, because of the fact that the Committee of the Privy Council did not meet, does not now exist. Meetings of the Committee are being held at regular intervals, and the fact that the Ministers are taking an active interest in the work of the Council and are exercising their responsibilities under the Act, should be a source of gratification to the Council and the public, rather than of complaints such as you have made.

Obviously, the Committee may, if it desires to do so, consult the National Research Council, or any other organization or individual, but, even if asked to advise, no such organization would have the right to assume that their advice would be accepted. The recommendations of the Research Council on this question have not always been accepted by the Government in the past, for on at least two occasions since I became a member of the Council the Government in making appointments has acted independently of any Council recommendation. . . .

May I add further that if the question was not brought up at the last meeting of the Research Council for recommendation, the responsibility did not necessarily rest with me. For many years past it has been known that at the end of each fiscal year vacancies occurred to which appointments would be made and it was open to any member of the Council to raise the question. Had it been raised, I intended to suggest, as I have stated above, that unless we were asked to nominate, we were acting without authority.

I think the foregoing disposes of your personal grievance.

Communications from Universities

You challenge the accuracy of my statement that communications had been received expressing the view that representation from the universities should be from those actively engaged in the work of the universities. I did not say that these communications had been received by the Coun-

cil, and an intelligent reading of my letter will show that I said such communications had been received by the Committee of the Privy Council. You will doubtless recall that on a previous occasion Queen's University expressed very decided views on the subject to the Minister, and while reference to their communications was, for obvious reasons, not made in the minutes of Council, nevertheless Council was aware of the communications which resulted in the appointment of Dr. Clark to the Council.

I am not at liberty to communicate to you what took place at the meeting of the Committee of the Privy Council, but I would suggest that if you want further evidence on that subject, you communicate with the authorities of McGill University as to what action they took in the matter. If they desire to give you information on that point, you will probably be convinced of the accuracy of my statement.

You ask why such communications were not brought before the Council, if they were received. You are completely answered by the statement already made that such communications were addressed to the Government, and, as such, were not subject to the action of the Council. You are surely thoroughly aware of the fact that they would not, and could not be addressed to the Council, since the Council has no jurisdiction with respect to appointments.

Appointment as President

At another point in your letter you state that I had myself appointed President of the Research Council for seven years at my present salary, and that this was done without any recommendation from the Research Council. This also is an inaccurate and misleading statement. I am not concerned with the historical resume you make of your own activities previous to my coming to the Council, although I do not wish to belittle the value of your services. Notwithstanding all that you say on this subject, however, you are well aware that when I became a member of the Council sometime after my return from overseas, its affairs were at an extremely low ebb. Not a single one of its members was prepared to accept the chairmanship. Furthermore, as you know, when the chief administrative position formerly occupied by Colonel Gaudet was vacant, only one application was received, and that from a person who was considered to be unsuitable for the position. I was then especially asked by the Council itself whether I would be willing to accept the permanent chairmanship. The resolution to this effect was seconded by you, and the negotiations with the Chairman of the Committee of the Privy Council were carried out by Dr. Adams, who preceded me as Chairman

of the Council. I would suggest that you read carefully minutes one and two of the Proceedings of the 55th Meeting of the Council.

The question of the amount of the salary was not raised, but I informed the Council that they were asking me to give up the headship of one of the leading universities of Canada where the income was greater than the salary paid in the past to the chief executive of the Research Council and they were also asking me to accept a position, the future of which was so uncertain that no one on the Council was willing to take the risk. One member of the council stated at that meeting that he "would not accept the chairmanship under the present circumstances at $100,000 a year". I am sure you will recall that the question was even raised as to whether it would not be wiser for the Council to resign in a body. Personally, I was exceedingly anxious that the one effort that had been made to create a national scientific body should not fail, and I suggested to the Council that if the Government of Alberta would permit me to take the *honorary* presidency, I would consider doing so at least for a sufficient period to make sure whether the work of the National Research Council could be put upon a permanent basis. At that time it was distinctly understood that if in the future I wished to take the permanent chairmanship of the Council, I would have the backing of the whole Council. The statement was then specifically made in open Council that if I should do that in the future, my arrangement with the government should accord me ample protection. I should certainly have refused to have my personal contract with the Government supervised by anybody but the proper legally constituted authorities. I did not consider then, nor do I consider now, that I was making a contract with the Research Council, and consequently I was free to conduct such negotiations with the government as I saw fit.

After I had put in several years of strenuous work as President of the Council, the situation had improved to such an extent that the Chairman of the Committee of the Privy Council considered it essential that the President of the National Research Council should devote his whole time to its work, and I was on many occasions urged both by the Minister and by members of the Council to resign the presidency of the University of Alberta to accept the full-time presidency of the Council. The question was fully discussed by the Council before I finally agreed to come to Ottawa, your statement to the contrary notwithstanding. However, if you held such strong views as to the salary which the President of the Council should receive, you should have expressed them at that time.

It will be apparent from the foregoing that your statement that I had

myself appointed President of the National Research Council for seven years, with a salary of $15,000 a year without consultation with the Council, is untrue. Further, the various events, to which you refer in order to bolster up this particular charge, are equally incorrect and in my opinion calculated to mislead.

However, all that has been said on this subject is beside the point, since, according to Section 5 of the Research Council Act, the President is appointed by the Governor in Council on the recommendation of the Committee of the Privy Council, and his term of office and salary are determined by the Governor in Council.

With regard to the method by which the salary of the President of the Council was fixed, here again your statements are wholly incorrect. What actually happened was that, acting under the authority of Section 5 of the Research Council Act, the Governor in Council passed an order, P.C. 515, dated March 30th, 1928, providing that the salary of the President of the National Research Council should be $15,000 per annum. This was passed quite without relation to myself and was intended to apply to any individual who might be appointed to the position. Moreover, this salary is not out of proportion to the salaries paid to corresponding officers in other institutions, as you imply.

Subsequently, an Order-in-Council was passed (P.C. 597, April 18th, 1928) with the full approval of the Research Council, appointing me to the position of President which appointment automatically carried with it the salary provided for the position by the previous Order-in-Council. Your sinister suggestion notwithstanding, in neither of the above Orders-in-Council is any mention made of the directorship of the National Research Laboratories. This question was discussed and settled by the National Research Council, as recorded in its proceedings.

All the foregoing transactions were carried out in strict accordance with the provisions of the Research Council Act, and no other procedure could have been legally followed. It is hardly necessary to say that I would not for one moment have accepted the presidency, except on the knowledge that the Council desired me to accept it.

You will see from the above, that your source of information on this matter was not very reliable.

You say in your letter "I have ascertained with considerable certainty that the Committee in this case except in one minor matter acted wholly according to your recommendations." As the only persons who have knowledge of what took place at the meeting of the Committee of the Privy Council were the members of the Committee themselves, I take it you wish me to understand that some Minister of the Crown gave you

information as to what went on at the meeting of the Committee. It would require further evidence in addition to the statement in your letter to convince me that such was the case. The statements already made in the preceding parts of this letter are my answer to that suggestion.

Expenditures of the N.R.C.

You have also stated that, through some mysterious source of information, you learned last spring that the expenditures of the Council may come before the Public Accounts Committee of the House of Commons, and that this fact so greatly disconcerted you that you decided to remain at home from the meetings of the British Association in South Africa "in order to be certain that the expenditures for assisted researches would pass muster." Surely you cannot expect anyone to take such a statement seriously.

In the first place, you have been chairman of the Assisted Researches Committee ever since I became president of the Council. If the work of the Committee was not conducted in a business-like manner, the responsibility rests upon you. Do you wish me to understand that there had been anything irregular about the transactions of your Committee which would cause anxiety, should this phase of our activities come before the Public Accounts Committee? I cannot for a moment believe that you are serious in making such a suggestion. The truth of the matter is, as you are thoroughly aware, that the National Research Council has nothing to fear from any investigation which the Public Accounts Committee of Parliament may desire to make. All of the receipts and expenditures of the Council are audited regularly by the Auditor General's Department, and in the five years during which I have been President of the Council the Auditor General has not found it necessary to print in his annual report a single letter relating to the accounts of the National Research Council. In view of these facts, I would certainly hesitate to believe that the business of the Council had anything to do with your decision to cancel your journey to South Africa. Personally, I covet the fullest investigation at any time by the Public Accounts Committee of Parliament as to the manner in which the moneys voted to the National Research Council are expended.

Personal Reflections

Coming now to the more intimate personal reflections of your letter, you charge me with two offences. Although you have taken a very roundabout way to say it, the fifth paragraph on page three of your letter is nothing more or less than a statement that I had deliberately misled you, and the whole temper of your communication is a charge of acting disloyally to my colleagues by trying to minimize the importance of the

functions which they are supposed to perform and magnifying the functions of the office which I occupy. Both these suggestions are utterly false, as the preceding sections of this letter must demonstrate, even to one as prejudiced as you appear to be.

I have been for forty years a public servant, during which time I have held many positions of trust and responsibility. Consequently, my record for truthfulness and honour is sufficiently known to make it unnecessary for me to offer any defence of your unsupported assertions. It is my opinion that during the whole term of your service on the Council with me you have never been able to forget that you were at one time Administrative Chairman nor to forgive me because I refused to permit you to dictate the policy for which I am now responsible.

When I came to the Council we were handing back to the Government nearly one-third of the small vote that was then being made. I threw myself with all the strength of my mind and my experience in organization into creating the machinery by which large researches could be undertaken. The fact that Parliament has each year increased the vote to the Council and last year not only voted $400,000 for the Research Council's work without criticism, but, in addition, sanctioned a large expenditure for research laboratories, is my justification for the belief that the conduct of the Council under my administration has been satisfactory to the public.

I suppose I should not feel injured by your suggestions because, looking back over the past five years, I cannot remember a single instance where I appealed to you, as I did in the beginning of my presidency, for your judgment of men that I received from you a single generous judgment. I can recall the names of half a dozen of the leading scientists of Canada concerning whom I asked your advice as to their fitness for certain responsibilities—names as well known in Canada as either yours or mine—and in not a single instance did I get from you other than an adverse opinion. You may recall that during the last three years I have not consulted you at all about men, for the simple reason that I was forced to the conclusion that I could never hope to get an unprejudiced opinion.

You threaten to "give wide publicity" to your letter if I do not permit you to dictate the policy of the Research Council. In reply, I would say that I would be false to the trust that had been placed in me, if I allowed my actions to be influenced in any way by such a threat as yours. I personally court the fullest publicity in relation to any act of mine. However, if you publish your letter, I will be compelled to publish a reply, and I will be quite content to let the public judge us. . . .

I am not at all moved by your "heartless irony".

TO H. M. TORY FROM A. B. MACALLUM, LONDON, ONT., 30 NOV. 1929

. . . I know what would be said if I made public the contents of a letter marked "personal". Is one who has been a President of a University and also an ordained clergyman, as, I understand, you were, absolved from observance of the conventions that gentlemen in their dealings with each other must observe! . . .

You say . . . "that during the last three years I have not consulted you at all about men for the simple reason that I was forced to the conclusion that I could never hope to get an unprejudiced opinion". This is one of the most mythopoetic statements that I have ever read. In the last six years you never even once asked me for my opinion. . . .

The most charitable explanation for the statement just referred to which you have made is that on this, as on not a few other occasions in your conversations with me, you allowed your intensely prejudiced imagination to run riot over your memory.

A Scheme for Limiting Reappointments

. . . I planned to introduce this year if I were still a member of the Council a motion which, if accepted by the Council, would provide that all reappointments, including those of 1929, of those who have already served as members for three or more years, would not be repeated on the expiry of the three years of each of such reappointments. This would provide for the retirement of five in 1932, five in 1933 and five in 1934 of all those who had then served six or more years and in 1934 there would be, so far as its membership would be concerned, a new Council. The Council, if it accepted and adopted this as a by-law, as I believe it would, would experience no difficulty of a personal character in recommending the proper appointments to fill the vacancies in its membership and by 1935 the term of membership would be three and at most six years. . . .

TO H. M. TORY FROM A. B. MACALLUM, LONDON, ONT., 26 DEC. 1929

. . . You will now deny that you made such statements but in doing so you will confirm my diagnosis of your incurable propensity to say rash things. . . .

. . . Always, in fact, when the Council authorized the establishment of any Associate Committee you would almost invariably say: "Allow me to appoint the Committee"! . . .

I know what all this correspondence and my opposition to your policy

and performance entail to me and mine. After the Council meeting of October 11th, 1927, when, with four others, I opposed your appointment as Director of the National Research Institute, one gentleman—who after the meeting heard all about it—remarked to me: "Dr. Tory will get you out of the Council at the earliest possible date." I did not accept this seriously at that time, but he has now proved himself to have more foresight than I. . . .

This ends my correspondence with you.

RELATIONS WITH GOVERNMENT

TO THE HON. JAMES MALCOLM FROM H. M. TORY, OTTAWA, 27 FEB. 1929

The difficulties of the situation in which I find myself have become so great that I am impelled to place them before you in writing.

As you know, I have been negotiating with certain men who would be capable of taking the headship of various departments in the Research Council's organization. I have also been going forward with having plans prepared for the new laboratories and also plans for the temporary laboratories in one of the old buildings on the Edwards property. These latter laboratories will be ready for use about the 1st of May.

As you are doubtless aware, all men occupying university appointments must give notice of continuation or otherwise of their services not later than March 1st of each year, and generally three months notice is necessary, in order to carry out honourably their old engagements. I am therefore faced with the situation that I may find it impossible to secure any of the men with whom I have been negotiating, due to the fact that on the first of March they may be compelled to give definite answers to their own institutions as to whether they are remaining for another year.

With regard to the laboratories, I have been forced to undertake responsibilities in reaching decisions with regard to plans and equipment that I should not have been forced to take and concerning which I should have had the judgment of the most expert men in their departments available. Fortunately, wide experience in laboratory methods and practice has made it possible for me to take that responsibility so far, but the time has come when it is absolutely necessary that I have authority to get assistance of some kind. Up to the present moment I have called upon the services of certain scientific men who are personal

friends and who have given me their assistance gratuitously, but I feel that I have reached the limit to which I can go in that direction. As matters stand, I have no authority to get any assistance of any kind. Recently, when it became necessary to secure the services of a young man for merely mechanical work, I found that the only authority I had was for a salary of $60.00 a month—not sufficient to secure the kind of services required. An additional amount of $20.00 a month I am at present paying out of my own pocket, in order to get a man who could do the work.

There are two recommendations to Council now before the Government.

(a) One fixing the grade of salaries for the technical staff; and
(b) The other giving authority for appointments to the administrative staff, with salaries identical with those paid under the Civil Service Commission.

The first of these recommendations has been before Council for over three months. I would respectfully suggest that the grade of salaries be either granted or refused, and if they are refused that some suggestion should be made as to the reasons for refusal and the limit to which the Council feels it could go. Then I would know exactly what I could depend upon. As pointed out in my letter to Mr. Robb, the highest salaries asked for are, on the average, $1,000 less than corresponding salaries now paid in the professional and technical services of the United States, and, as you know, there is only a limited number of these higher salaries in any case. If this recommendation cannot be approved, I shall have to ask for authority to call in special technical help on an honorarium basis for the purpose of considering the many problems now facing me in connection with laboratory equipment.

The second recommendation to Council has been before the Government since the 9th of January. There surely can be no objection to the passage of this recommendation, as the appointments which it covers are of a routine character and have to do with the work of administration and, as previously stated, at the same salaries as are paid for similar work under the Civil Service Commission.

TO THE HON. JAMES MALCOLM FROM H. M. TORY, OTTAWA, 9 APRIL 1929

Following our conversation this morning, I would suggest that the Minister of National Defence be on our Research Committee, as there is no Department for which we will be doing more work in future. We

already have two or three large problems on hand for them at the moment, and I am only awaiting proper technical appointments to get this work started. In the present instance, of course, Colonel Ralston would be a tower of strength.

TO H. M. TORY FROM THE HON. JAMES MALCOLM, OTTAWA,
24 MAY 1929

With reference to your's of May 22nd, I would like to state that the subcommittee on Agriculture and Colonization, discussing proposed changes to the Grain Act, refused to consider the amendment to section 79 of the Act to place the Grain Research Laboratory, at Winnipeg, under the direction and control of the National Research Council. All the members from the West opposed the suggestion, and while there was some mighty plain discussion of the difficulties of working with Dr. Birchard* the committee seemed to feel that he should be under the control of the Board, and that the Board should take full responsibility for his activities.

No objection was expressed to Dr. Birchard working in conference with any Committee of the Research Council in the proper allocation of problems on grain research. The committee did feel, however, that there was no reason why the Board of Grain Commissioners should not be able to direct the activities of Dr. Birchard, even though the members of the Board present admitted their inability to properly control such activities.

TO MESSRS. SPROATT AND ROLPH FROM H. M. TORY, OTTAWA,
15 JUNE 1929

. . . Between ourselves, a little feeling has grown up around the fact that when the Prime Minister suggested that we go on with the development of the whole scheme, your office did not take it up promptly with the Minister of Public Works for the purpose of re-adjusting the contract on a new basis. The Minister of Public Works' position is that you have a contract with him and that he should have been consulted by you before you made any change in the plans. That, of course, is an internal local situation here, which will work itself out in due course.

In my discussion with the Minister the other evening, I told him that as I saw the matter now, we could not possibly spend more than the

*Dr. F. J. Birchard, Chemist, Dominion Grain Research Laboratory, Winnipeg, Man.—M.W.T.

money already voted. His reply to me was that that was quite correct and that the whole matter would have to be dealt with in Council again, as when the original Order-in-Council was passed it was not thought they would give a first contract much in excess of $1,000,000. I told Mr. Elliott* frankly that you hesitated to state in a letter that you had acted on the authority of the Prime Minister and that I fully appreciated your delicacy in so doing. He stated that he fully understood that. I took the bull by the horns then and said to him that you had acted on the Prime Minister's authority, when in a conference with Mr. Malcolm, the Prime Minister, myself and you, Mr. King had agreed that you were to complete the plans. I apologized to Mr. Elliott for personally not having seen that the matter was referred to him, but as from the beginning the Prime Minister had interested himself specially in the building I assumed that he would take the matter up with Mr. Elliott, which apparently he overlooked doing. . . .

The alternative to this would be for you to write a personal letter to the Prime Minister, stating exactly the difficulty in which you find yourself, due to the fact that the Public Works Department seemed to question your rights in the matter, and tell him that you had hesitated to bring his name into the question and you would be grateful indeed if he would take the matter up with Mr. Elliott and have it straightened out. On the whole, I believe this would be the wisest thing to do. It would carry with it, I am sure, the Prime Minister's goodwill, if you did. . . .

The Prime Minister asked me a few days ago how soon the plans would come forward, as he had expected to see them before this. I must confess that I too have been disappointed in the time it has taken to complete them. I have no doubt that your firm are working as fast as is reasonable to expect, but the fact remains that I was given assurance that they would be received by the first of May, and now the people here are asking me about the matter. Please, therefore, force the plans forward as rapidly as possible.

TO THE RT. HON. W. L. MACKENZIE KING FROM SPROATT AND ROLPH, 17 JUNE 1929

Re "National Research Laboratories"

A question has been brought up by the Department of Public Works, asking us how or where we got the authority to go ahead with plans for over a $1,000,000.00 of building, as we have been preparing a building

*The Hon. John C. Elliott, Minister of Public Works.—M.W.T.

scheme which estimates up to $2,771,250.00, which includes separate power house, utility tunnel, etc. etc.

We have had some delicacy in frankly putting it in writing that you said to our Mr. Sproatt, that the whole building must be gone ahead with as a unit. What is worrying the Department of Public Works, is that the order-in-council only calls for an expenditure of $1,000,000.00 and apparently not more than this amount can be used before 31st March 1930.

The correspondence on this question is becoming considerable and more involved as it goes on, and we have taken a hint from Dr. Tory to write you direct.

The great fault seems to be in our negligence of not notifying the Department of the order we got to finish the plans of the whole scheme. (Copy of plans now in Dr. Tory's hands). We are mere infants when it comes to knowledge of "Department Ritual and Procedure", and write this to see if it is not possible for you to help all parties concerned to clear up this matter.

We would like Dr. Tory to show you the plans, and how obvious it is that any one section of the building cannot be built as a unit.

TO MESSRS. SPROATT AND ROLPH FROM THE RT. HON. W. L. MACKENZIE KING, 29 JUNE 1929

Re "National Research Laboratories"

I have received your letter of June 17th. I confess that when I learned the Department of Public Works had not been communicated with before any changes were made in the original plans of the building contemplated, I was as much surprised as your firm may have been in having a question raised in this matter.

When I visited the office of the National Research Council and expressed an opinion with reference to the model submitted there, I was not speaking for the Department which has the matter within its jurisdiction, but simply giving my opinion as one member of the Government who would be prepared to advocate going ahead with the project as a unit. My words of approval of the scheme were intended to signify my willingness to back up the idea of the plans as revised, when submission of them would be made to the Cabinet by the Minister of Public Works. It had never occurred to me that Mr. Sproatt would regard the expression of an individual view as given at the time as sufficient to alter an existing contract between the Department acting on behalf of the Government and your firm.

However, I have endeavoured to explain the situation to the Minister of Public Works who has shown every desire to further the particular project, which, in the end, is likely to be of great service to the Country. The impression I had a week or two ago was that the matter had been satisfactorily adjusted, but if such is not the case, I shall be glad to lend my good offices towards bringing about immediately whatever may be necessary in the way of further consideration.

1930–1935

"There is in X much moral prinkery."
—Jean Rostand, 1962

"I can fetch you an argument; I cannot furnish you with an understanding."—Samuel Johnson

"Rotten wood can not be carved."—Confucius

"Even when one has spent money on first-class men and promising ideas, one has to reconcile oneself to the possibility of failure—which in any given case is at least as large as the prospect of success—and in any event to the lapse of a long period of time during which no one will know whether the Snark one is pursuing is a veritable Boojum or not."
—Viscount Hailsham, 1963

THE YEARS 1930–1935 were fundamentally different from the whole of the preceding period. Laboratories to undertake industrially oriented research on a sufficiently large scale to do the job properly had at last been assured. Actual construction began on February 28, 1930.

Tory gathered information about laboratories in England, France, Germany, and the United States and made this information available to the architects. However, he seems to have borrowed his ideas on style from closer to home, for he wrote to James Malcolm in 1928 that: "The middle section, which runs to about 230 ft., is to be pillared throughout, the general appearance of the pillars being somewhat like those on the front of the Union Station in

Ottawa. If you glance at that you will see that it is really not a severe looking treatment."

By then the Macallum affair had rumbled to its conclusion: Macallum sent the whole correspondence to Malcolm, as he had threatened, and was much taken aback when Malcolm sided with Tory (1).

The government changed hands in August of 1930, and the new Minister of Trade and Commerce was H. H. Stevens, who therefore became Chairman of the Privy Council Committee on Scientific and Industrial Research. This Committee, after its three-year burst of activity because of the founding of the new laboratory, relapsed into its comfortable habit of never meeting at all. This left matters in the hands of the Chairman.

The years 1930–35, the last years of Tory's presidency, were extraordinarily difficult and at the same time rewarding to Tory and the Research Council. The great depression of the early thirties brought hardship beyond belief. Thousands of young Canadians could find no work, the freight trains were crowded with young men travelling from one part of the country to the other looking for employment without any hope of finding it. The bread lines were everywhere, the outlook confused, there were riots and marches on Ottawa and the economic conditions were the worst Canada has ever known.

Jobs were very difficult to get, salaries were low, governments were authorized to retrench and scrutinize all expenditures, and under these circumstances the National Research Council found itself doubly embarrassed because during the middle of this period the National Research Laboratories were opened and the needs for equipment and staff were urgent and extraordinarily difficult to satisfy. Everywhere criticism, sometimes illy based, was rampant, nerves were frayed and tempers short. The correspondence reflects the temper of the times and its tenor should not be blamed on the fact that there was a change of government and policy during these years.

This was a very difficult period for the Advisory Council and particularly for Dr. Tory, but on the other side of the picture the formal opening of the Research Council Laboratories in 1932 was the culmination of a campaign that Dr. Tory had carried forward,

almost single handed, for many years and rounded out his concept of the National Research Council. And while it was impossible to obtain the required number of scientists needed to staff the Council laboratories he was able to obtain the services of extraordinarily brilliant people in even the junior positions of the Council, which would not have been at all possible under normal circumstances. Thus the apparent difficulties of that day paradoxically became the strength of the Research Council in the Second World War, for when the war broke out there were available in the skeleton staff of 300 of the Research Council the personnel who were to lead the future group of thousands of research workers.

In early 1930, before Mr. Bennett's government took over, there were only a few active laboratory projects being done in Ottawa by Council staff, mainly the magnesite work in the Bryson Building, and the beginnings of aeronautical and other research facilities in remodelled mill buildings on John Street. The most important facility was a wind tunnel capable of developing air velocities up to 160 miles per hour. This was being established by J. H. Parkin, Assistant Director of the Division of Physics and Engineering and formerly Associate Professor of Mechanical Engineering at the University of Toronto. Mr. Parkin had already designed and built a four-foot wind tunnel at the University in 1917—the second unit of its kind in Canada, the first having been built by W. Rupert Turnbull at Rothesay, New Brunswick, in 1902.

When Dr. Tory came to the end of his presidency of the NRC, in June of 1935, the laboratories on Sussex Drive were in operation, there were 54 on the professional staff, a total staff of 153, a budget of $550,000, and four operating divisions: Biology and Agriculture, Chemistry, Physics and Engineering, and Research Information.

Up to 1930, the National Research Council had operated mainly as an advisory body, giving scholarships and grants and organizing associate committee projects. Dr. Tory had been far-sighted enough to start some actual laboratory projects to act as a lever, such as the magnesite work; but now far greater things had become possible in the line of direct action on industrial research. Soon the words "National Research Council" would have a double meeting: on the one hand a body of men drawn from universities, government departments, industry, and labour; on the other hand a

complex of laboratories with a staff and facilities aimed at secondary industry.

The Advisory Council now had additional functions: to help choose the staff of the new laboratories, and to advise on the main lines of over-all policy to be followed in the new laboratories.

During the five years while the responsibilities changed, there were many changes in the membership of the Advisory Council. Because of confused and difficult political circumstances, delays in appointing members occurred and, at one time, the NRC was down to only four members. By 1935 there was again a complete complement consisting of the following members:

Dr. H. M. Tory, President
Dr. Frank Allen, Professor and Head of the Department of Physics, University of Manitoba
Dr. G. S. H. Barton, Deputy Minister, Dominion Department of Agriculture
Dr. H. E. Bigelow, Professor of Chemistry, Mount Allison University
Dr. R. W. Brock, Dean, Faculty of Applied Science, University of British Columbia
Dr. Charles Camsell, Deputy Minister, Dominion Department of Mines
Dr. A. L. Clark, Dean of the Faculty of Applied Science, Queen's University
Mr. A. Frigon, Dean, Ecole Polytechnique
Dr. F. M. G. Johnson, Head, Department of Chemistry, McGill University
Dr. O. Klotz, Chair of Pathology and Bacteriology, University of Toronto
Dr. A. S. Mackenzie, President Emeritus, Dalhousie University
Dr. C. J. Mackenzie, Dean of the Engineering College, Saskatoon
Mr. Tom Moore, President, Trades and Labour Congress of Canada
Dr. Julian C. Smith, Vice-President and Managing Director, Shawinigan Water Power Co.
M. l'Abbé Alexandre Vachon, Director, Ecole Supérieure de Chimie, Laval University

The Government of the day was headed by R. B. Bennett, who had many times stated his view that all government scientific services should be centrally coordinated and controlled. In a memorandum requested by Stevens, Tory was careful to state that "The Council does not desire to take work from any one." However he

did offer to bring all federal research programmes under review by the Council.* Here was the government's chance to do what had so often been said to be desirable—coordination under a central body.

As a result, with a great resounding silence, nothing happened. Government scientific services for agriculture, mining, forestry, and fisheries continued as before. Even the smaller laboratories, for example in the health field, went on with their business as usual. Agricultural research remained scattered, and uncoordinated by anybody—not even by the Department of Agriculture. The Minister of Agriculture, Robert Weir, refused to name anyone from his department to Tory's committee on agriculture,* and set up a rival committee of his own, to which Dr. Robert Newton, Director of NRC's Division of Biology and Agriculture, was appointed (2).

The Council, of course, continued to coordinate a portion of Canada's scientific effort by way of the Associate Committee mechanism. This brought together all parts of the scientific community from universities, industries, and governments. However, this committee device was largely restricted to national problems, in which all three components had an interest. It left untouched and uncoordinated most of the "in-house" scientific activities—pure science in the universities, the private affairs of private industries, and even the private affairs of public institutions such as government departments.

Curiously enough, while the reviewing function of the Advisory Council's members went begging—so far as other federal laboratories were concerned—the Council's new laboratories themselves did not do too badly. Several bits and pieces, whose transfer had already been agreed upon in principle, were taken over by the National Research Laboratories, even before they opened. The Bennett government abolished the Department of the Interior, fired a large percentage of the staff, and transferred the Physical Testing Laboratory, and with it the maintenance of the country's basic standards of physical measurement, to the National Research Council. These new responsibilities were assigned to NRC's Division of Physics and Engineering.

When these projects were taken over from government departments by the National Research Laboratories, the staff came too.

*Document quoted in this volume.

This caused personnel problems. Some of these men were paying superannuation. At this time the Civil Service Commission had more faith in clubs than in carrots, and was using the club of simple confiscation of a man's superannuation payments if he left the service in his first ten years, the idea being to keep men in the service.

Tory wanted freedom to eliminate undesirables, or to push a good man into industry if he showed promise in that direction, and all the other freedoms given by the NRC Act regarding personnel. He therefore wanted at least the right to return the man's superannuation money to him, without interest. Stevens said that he was sympathetic,* but in fact nothing was done for many years, and the new laboratories therefore had two different kinds of employees from the beginning. This was unexpectedly beneficial to the administrative staff: immediate access to two rather different sets of rules gave them automatic depth perception into problems of the administration of government science. Upon this unusual ability it was possible to found a flexible and sensitive administrative service, peculiarly well suited to the needs of science. It was a great advantage to be served by men who knew in their bones that a different rule was possible.

In his memorandum to Stevens referred to above,* Tory tried to do two jobs at the same time. He wanted to *collect* under the new laboratories all government scientific work that would benefit from such a move—standardizing and the like. And he wanted to *coordinate* all the work that should obviously remain lodged in the fabric of the various departments—work related to their regulatory functions. The first job concerned the National Research Laboratories; the second, the National Research Council.

One of the reasons for partial success in the first project and total failure in the second probably resides in simple semantic confusion between National Research Laboratories on the one hand and National Research Council on the other. The first is a system of federal laboratories; the second is a body of independent advisers. But they have the same President, they are intimately related, and their titles are closely similar. If you ask a Laboratory employee where he works he will say "The National Research Council." Insiders know very well when "NRC" refers to the laboratories and

when to members of Council. But outsiders have difficulty making this distinction, even when it has been explained to them.

Tory tried to explain that "administration of the National Research Laboratories is only one of the many functions of the Council." But it can be speculated that, from the outside, his plea for coordination looked like an attempt by the new laboratories themselves to dominate all the others, and to become "more equal" than anyone else.

It is also possible that Bennett was reluctant to give any further power to Tory, towards whom he felt a deep and bitter animosity for having founded the University of Alberta in Edmonton rather than at Calgary (3).

On August 10, 1932, the National Research Laboratories were officially opened by His Excellency, the Earl of Bessborough, Governor-General of Canada. Other speakers included the Prime Minister, the Rt. Hon. R. B. Bennett. This was a private ceremony, with several hundred carefully chosen guests. On the following day the buildings were opened for public inspection and a second ceremony was held at which the Rt. Hon. Stanley Baldwin, who was in Canada for the Imperial Conference, presented a gift to the new laboratories. This gift consisted of a number of portraits of eminent scientists, provided by Surgeon-Captain R. J. E. Hanson of Fowey, England. An incredible number of the smaller products of Canadian industries had been sedulously collected for many months, and these were also on display.

Tory made the most of these ceremonies, knowing as he did that he was at the centre of a moment of triumph. This was the day for which so many Council members, past and present, had longed and striven, and which had required of them half of all their efforts for fifteen years. The black despair of the early twenties, the disappointments, the long deferrals, and all the sacrifices of time and energy were converted by this day into so many stages along the road to an ultimate success. A nation had been persuaded to place a bet on the future.

Every morning, Tory would walk completely round the sub-basement, then the basement, then the three floors; when this ritual was over, having walked a complete mile inside his new building, he could go to work.

It was as well that he took pleasure while he could. An embarrassing amount of attention was drawn to the cost of the furniture in his office, including letters to the Prime Minister,* resulting in an interview with Stevens.* A waste basket that cost more than six dollars became a nine days' wonder, and exaggerated rumours* aroused resentment towards the Council in many parts of a country suffering from economic depression. It was not a good beginning.

Tory's plans for building a suitable staff were dealt a staggering blow by the Order in Council that abolished all unfilled positions in the public service.*

During these miserable years, Tory took a gloomy pleasure in countering the Minister's attempts at "hire pressure" by remarking that cuts in the budget made it well-nigh impossible to hire anybody at all (4). When pushed* he would also reveal that the Minister's nominees for scholarships invariably had much lower qualifications than anyone else on the list* and, in consequence, never made the grade.

With this particular Minister, Tory for the first time felt a need to record exactly what went on during ministerial meetings and interviews. These memoranda of his conversations with Stevens covered a wide variety of topics, and a number of them are quoted to illustrate their range.

Stevens continued to niggle and, during 1932, got down so far as to demand a full report on a matter involving $12—in cash.* He took such an interest in such piffling matters that finally Tory, with a straight face, asked him if he also wanted to control the ordering of standard office supplies—paper clips and the like. Stevens said no he didn't (2).

In 1932, the Institute of Parasitology was founded, with financial assistance from the Empire Marketing Board and with a building provided by the Quebec Department of Agriculture (5). NRC paid the salaries, but McGill University made the appointments. The Council organized and directed the work through an Advisory Committee on Parasitology, a joint committee of NRC and McGill.

By 1933, the members of the National Research Council had outgrown certain things to quarrel about amongst themselves. The fifteen years' argument over laboratories had been taken away by success, and the battle for leadership was also a dead issue: Tory had beaten the fire-breathers of earlier generations, and had estab-

lished an indisputable dominance over all academics in the scientific community.

However, relations with the Chairman of the Privy Council Committee on Scientific and Industrial Research continued to be rather uncomfortable. The new laboratories were slowly being throttled by lack of men and money. Under the hard grind of the depression, Stevens over-reacted to small expenditures. Tory wished to send an executive secretary with one stenographer and one office boy to look after the Fifth Pacific Science Congress, to which Canada was playing host (6). This, in Stevens' eyes, constituted erecting an "elaborate staff," and he asked Tory to refrain from too elaborate and ambitious proposals (7). Yet Stevens had bullied the NRC into hiring his own nominee for that stenographer's job (8), although the girl whom Tory preferred† was unquestionably better qualified (9).

Because the Council's Laboratories were not permitted to hire the staff previously agreed to, some of the space in the new building was still vacant. The Health Department, the Radio Commission, and the Tariff Board promptly moved in.* This was irksome to Tory, particularly as the Radio Commission then found that they needed twice as much space as they thought.

Stevens had asked Tory not to spend the capital vote that had already been made, through the Department of Public Works, for equipping the NRC building; in return he would see that this money was re-voted the following year. Tory agreed. But this money was not re-voted, to Tory's consternation, and in the meantime the Health Department, the Radio Commission, and the Tariff Board were using this very fund to equip their newly acquired offices—in Tory's new building.* Tory, of course, was in no position to object, and was reduced to spluttering that the NRC laboratories were "left in an extremely difficult position regarding equipment." He could hardly say what was in his heart: that hordes of squatters were sardonically permitted to use that money which had been denied to him. Tory's ointment now had a good many flies in it.

Because of questions in the House of Commons, Tory was

†The times were very hard. All government salaries had already been cut ten per cent—and to have a job at all was a considerable achievement. It is interesting that, under these stringent circumstances, proven competence and ability could be of so little moment.

required to explain his travelling expenses since the beginning of his presidency.*

The grinding poverty of the times was vividly illustrated by offers of scientific and technical service *without payment*, merely to keep well-trained young people off the street.* This was a very delicate operation: such workers had to follow the exact discipline observed by their salaried colleagues, yet no pressure could be brought to bear upon them other than moral pressure alone.* Tory thought he could do it, and undertook to discuss the possibilities with General McNaughton, who was training young people in the engineering field under a relief scheme. A number of such workers were engaged during the year.*

Tory began to use Dr. Robert W. Boyle, Director of NRC's Division of Physics and Engineering, as his Crown Prince, and officially put Boyle in charge when he was away from the office.*

Meanwhile Stevens called in question the salaries paid to the senior staff (10) and said that he did not believe Tory's statement that the value of the work done by NRC was greater than the money expended on it. He should not have said that. The floodgates were opened: Tory countered* by reviewing the history of the Council, giving thumb-nail sketches of his three directors, and hitting all the financial high-spots he could think of to justify NRC's ways to Stevens. Tory explained that, in long-range industrial research, some projects (about 15%) never paid off at all and the rest took an average of five to ten years, even at the Mellon Institute. This, of course, was precisely what Stevens was complaining about. He and the men about him could never quite grasp the gambling element in research, and sorrowed over individual nickels that failed to hit the jackpot. Also scientists lived by a different clock: an industrialist with a project knew in months exactly where he stood; the scientist needed about the same number of years.

It is doubtful that Stevens was ever much impressed by Tory's list of millions added to the Canadian economy by research (on wheat rust, magnesite, smelter fumes, etc.), but at least he never again raised any question over the salaries paid to directors. He had been truly bludgeoned.

Because of Stevens' scepticism, Tory was driven to the childish expedient of collecting the several scores of "letters of commenda-

tion" received each year from grateful industrialists, to prove to Stevens that the Council's work was useful.

The employment situation became so bad that highly qualified men competed for insignificant positions.* Stevens expressed interest even in emergency jobs lasting one month.* A year's free work might or might not help to land a temporary job at $60 per month* and, when a professional job was filled, at $100 per month, the lucky man was asked to keep quiet about it.*

The Council and the Department of Agriculture came into conflict over wheat surpluses. The Council claimed that quality was lowered by the prevalence of Garnet wheat and that this variety should be actively discouraged.* The Department knew this but preferred to let Garnet wheat die a natural death (11)—a rather difficult feat since certain government officials in Alberta were still pushing it (12). The wheat situation led Tory to advocate diversified farming for the West.*

Stevens had now hardened into the pattern of over-reacting to small expenditures. His relentless economies had very nearly brought the work of the National Research Council to a standstill.* The depression had convinced him that his highest function was to prevent expansion of any kind, regardless of what these economies might cost. The Department of Agriculture innocently hired one additional chemist, but in Stevens' eyes this became "further expansion of the Chemistry Branch," and he suggested to the Minister of Finance, in his capacity as Chairman of the Treasury Board, that the time had come to concentrate these activities under the National Research Council.* Again.

The Hon. Mr. Rhodes responded with a long list of researches, carried out by the Council, that he thought were duplicating the scientific work of the Department of Agriculture.

Robert Newton was once again forced to point out that all of this work had been planned together with officials of the Department of Agriculture for the precise purpose of avoiding duplication.* There was no duplication. He said that the Council had already achieved considerable success as a coordinating agency through the medium of its Associate Committees. Any drastic reorganization and consolidation of services could only be done by a body very definitely endowed with specific authority.*

Apparently the government once more decided in favour of

leaving things alone; at any rate the necessary specific authority was never given.

Stevens resigned from the Ministry of Trade and Commerce in October 1934 and was succeeded in the following month by the Hon. R. B. Hanson. The NRC immediately pressed for an increase in the parliamentary vote, following the psychologically sound notion that a new man might make some changes. Their pitiful recital of disastrous budgetary cuts—coinciding with the engagement of staff for a new building—was enough to make a statue exude blood.* The resulting improvement was an increase of over 50 per cent (13), pushing the NRC past the half-million mark for the first time since 1930. In the nick of time, it once more became possible to breathe.

In 1935, Dr. J. C. McLennan, one of the prime movers in establishing the NRC and a Council member from 1916 to 1931, was made a Knight Commander of the British Empire. He had been a Vice-President of the Royal Society of London and there had never been any doubt that he was a brilliant man. However, McLennan had always considered that he had unquestionably earned a knighthood during the First World War, in his research work for the British Admiralty (14). This honour came to him only a few months before his death; but it *had* come and all who knew him were glad—not only his colleagues but men in high places, such as former prime ministers, who had learned to respect their irascible professor of physics. For Canada, Sir John McLennan was probably the last of the breed of scientist whose outlook was slightly reminiscent of *Tyrannosaurus rex*.

On April 18, 1935, R. B. Bennett phoned Tory, offering him the C.M.G., which Tory refused. Like McLennan, Tory considered that the only honour appropriate to his services was a knighthood. Bennett knew this very well indeed, and he had not phoned out of kindness. This incident is treated at some length in E. A. Corbett's life of Tory (3).

The new Minister, R. B. Hanson, was quick to let Tory know that he was no more sympathetic to Tory than H. H. Stevens had been (15).

On February 26, 1935, Tory brought up "the matter of my continuing," since his appointment as President would expire on the first day of June (16). Hanson put him off.

On May 7, 1935, Tory handed the Minister a letter regarding his

appointment as President of the Council (17). In this letter he asked for an extension for two years, to round out his work. Hanson replied on May 29th, saying that there would be no extension.*

The Order in Council appointing Tory gave him the right to continue until a successor was appointed (18). No successor had yet been appointed. Tory asked, on May 30th,* if he was to continue, according to the old agreement, or if he should leave the office on the first of June.

Hanson replied* on May 31st, 1935, that "the term of your service as President of the National Research Council expires as from May 31st, 1935."

WORK IN THE NEW LABORATORIES

The new laboratories contained four divisions, to deal with biology and agriculture, chemistry, physics and engineering, and research information.

Biology and Agriculture

With the completion of the new laboratory building, the work of the Division of Biology and Agriculture, which for four years had been carried on at the University of Alberta under a cooperative arrangement, was transferred to Ottawa. Because of the economic depression, it was not possible to expand the staff and programme as originally planned for this occasion. However, a nucleus of the prospective staff had been established, and considerable progress was made in the carefully planned programme of research.

The work at the University of Alberta consisted of projects initiated largely at the request of associate committees. Dr. J. Ansel Anderson worked on the biochemistry of rust resistance in wheat. Dr. W. H. Cook worked on gluten proteins and on grain drying (this grain drying work had considerable economic impact). Dr. J. G. Malloch standardized experimental baking tests with the help of statistical studies by Dr. J. W. Hopkins. Dr. Hopkins' main project was agricultural meteorology.

The move to Ottawa in 1932 involved everyone in furnishing the laboratories plus the establishment of such major facilities as the greenhouse, constant-condition chambers, refrigeration equipment, and equipment for research on the malting of barley. Several of the

projects initiated in Alberta were completed in Ottawa, with publication often several years later, but the Ottawa programme was quite different from that at the University of Alberta.

Chemical weed killers were studied throughout this period by Dr. W. H. Cook, in relation to a weed survey of the Prairie Provinces, by J. M. Manson, started under the Associate Committee on Weed Control.

Dr. Malloch discovered a number of ways to improve the cleaning and handling of barley, while Dr. Hopkins analysed statistically the effect of fertilizers on the yield and composition of barley. Dr. J. Ansel Anderson began his long and detailed series of studies on barley research. Dr. R. C. Rose studied the barley proteins.

Other statistical studies by Dr. Hopkins included an analysis of data collected by the Associate Committee on Accurate Plot Work, the influence of weather conditions on the growth and yield of wheat, the results of experimental feeding trials on swine, and the variation in weight of some internal organs of the domestic fowl.

When Dr. F. H. Peto joined the Ottawa staff on his return from Britain with a Ph.D., the greenhouse was available and he undertook his work on mutation in cereals and on the hybridizing of wheats and wheat grasses. When the refrigeration equipment was available, Dr. Cook began his food storage studies. Poultry was the first item of investigation in the new rooms, and this series of studies has had highly beneficial effects on the industry. Celery storage work was done in commercial warehouses, and later led to a series of designs for food storages.

During 1933–34, the Division was asked to undertake tests on the reliability and calibration of several different types of electrical moisture meters, designed for use with cereal grains. Much of this work was done in the Grain Research Laboratory in Winnipeg, but Dr. Cook was heavily involved and Dr. Hopkins was responsible for most of the statistical analyses.

During the 1932–35 period, a good deal of time was given to the design, operation, and testing of the constant-condition chambers. As an aside, it is gratifying that the principles of this design are very much the same as in the modern chamber available thirty years later. The mechanical parts have been altered but the basic size and shape are quite similar.

During this period the Trail Smelter Fume Investigation was extremely active. This was handled by a committee at the request of the International Joint Commission and involved Dr. M. Katz of the Division of Chemistry. Dr. G. A. Ledingham worked on this problem as a student; on graduation, he was appointed to the Council staff, through its Publications section. However, the Trail Smelter work continued and he spent most of his summers in the field. With the appointment of others to the editorial duties, he spent his winters in the laboratory and initiated studies on the fermentation of agricultural wastes.

(In later years, this division changed its name to the Division of Applied Biology, and later still to the Division of Biosciences. Out of its evolving fabric grew two regional laboratories: the Prairie Regional Laboratory, on the campus of the University of Saskatchewan in Saskatoon; and the Atlantic Regional Laboratory, on the campus of Dalhousie University in Halifax.)

Chemistry

Work on magnesian products was carried on throughout the period 1930–35 under the direction of F. E. Lathe and A. F. Gill, with the cooperation of Canadian Refractories Limited and the Federal Department of Mines. This work was coordinated by the Associate Committee on Magnesian Products, and the net result was a viable Canadian industry in spite of the economic depression. The Canadian product, formerly regarded as inferior, was put on an export basis. Dr. Tory liked to point out that the freight rates alone on the new products, in one year, were higher than the total cost of the investigation.

Gas research was done by Dr. A. Cambron and Mr. C. H. Bayley, to find commercial uses for waste natural gas in western Canada. One of their several successful processes produced olefines, a valuable raw material that could be converted to aromatics such as benzene. Diolefines were used to produce butadiene and isoprene, and these became useful in NRC's early studies on the production of synthetic rubber. Many other chemicals were produced, as raw materials for anti-freeze and for explosives.

Work on asbestos was done by D. Wolochow and A. van Winsen, and an economic use for asbestos tailings was worked out to produce

active silica and magnesium salts. Various tests used in the industry were standardized, and several products, such as asbestos cements, were studied at the request of the producers.

Work on wool was done by Dr. Paul Larose and Miss A. S. Tweedie, and a number of testing methods were established for wool and wool products, many of them in cooperation with the Animal Husbandry Department of the University of Alberta.

Leather research was done by Dr. W. E. Graham. He found that in 1930, the hides from at least 50 per cent of all cattle slaughtered were damaged by open holes or scars caused by the warble fly. Many industrial and service problems were studied throughout this period. Largely as an off-shoot of the work on leather, Dr. W. Gallay studied the colloids involved in the tanning process.

Maple products were studied by Mr. L. Skazin. He found a process for producing syrup with a flavour ten times more intense than the normal by boiling under pressure. This could be diluted with cane syrup. He also found a way to avoid the mottling of maple sugar.

Rubber was obviously here to stay, and was studied in those days mainly by Dr. M. Katz and Mr. T. R. Griffith, who found that adding carbon black greatly increased the strength of synthetic rubbers. This carbon black had been prepared by Dr. L. M. Pidgeon from the natural gas of Turner Valley. Katz and Griffith threw considerable light on the structure of rubber. Plastic-rubber compositions were improved for Canadian companies, which enabled them to meet foreign competition. This laboratory also developed a new adhesive for bonding rubber fabrics to metal surfaces.

Dr. Pidgeon and Dr. D. F. Stedman both worked on the carbon black problem, but both became famous for other reasons. Dr. Stedman turned his attention to the distillation problems of the Turner Valley oilfield, and evolved the Stedman Column, a fractionating column of extraordinary efficiency (10 times more effective than earlier columns), and this was adopted all over the world. Dr. Pidgeon studied metallic magnesium, and thereby became the originator of a large Canadian industry.

Laundering and dry cleaning problems were studied by Dr. O. M. Morgan, B. J. Kenalty, and C. H. Bayley. This laboratory became closely integrated with the industry it served and was often mentioned by Dr. Tory as a happy example of service to industry.

A chemical investigation of poisonous weeds was begun by Dr.

R. H. F. Manske. New alkaloids from a number of species were isolated and examined to determine their structure. He was joined in this work by Dr. Léo Marion, whose structural studies on plant extracts have become of great fundamental interest.

Dr. G. A. Ledingham directed the biological aspects of the Trail Smelter Fumes Investigation and the whole programme was pushed to a successful conclusion.

Dr. N. H. Grace studied the production of dried apples and greatly improved the product. Later, he joined in a cooperative attack on the problem of the tainting of various food products carried in box-cars that had previously been used for shipping apples: this work was done with the Department of Agriculture and NRC's Division of Biology and Agriculture.

Dr. W. Gallay examined a wide range of Canadian clays. He showed that one Canadian clay from Manitoba was superior to every imported material for nearly all uses—refining, bleaching, recovering—and two plants were erected for activating this material.

Dr. C. Y. Hopkins studied refuse screenings from Canadian wheat, synthetic resins for safety glass, and various ways for producing power alcohol.

A very wide range of other topics and problems was also studied in the Division of Chemistry, and several hundred analyses were done each year for various government departments and industries, ranging all the way from food for ranch beavers to the cleaning of public statues (use ammonia). One small study that might be mentioned in particular is the work of Miss (Dr.) H. D. Chataway on the carbon ink that was eventually chosen for use in the Canadian Book of Remembrance, along with other technical matters concerning materials to be used in the book.

(In the early fifties, this division was divided into the Division of Pure Chemistry and the Division of Applied Chemistry.)

Physics and Engineering

One of the first groups to be established in the Division of Physics and Engineering was concerned with aeronautics; it was under Dr. J. H. Parkin, Assistant Director of the Division, with the assistance of Dr. J. J. Green, George J. Klein, S. J. Murphy, Dr. K. F. Tupper, and M. S. Kuhring. Their wind tunnel had its first run under full power in 1931, with a maximum air speed of 163 miles per hour—

at the time a respectable achievement, ranking second in the world.

From the beginning, this wind tunnel was used for some non-aeronautical work as well as on aircraft. An early example was a study to develop an improved external form for railway locomotives, at the request of the Canadian National Railways. Smoke from the stacks of existing locomotives tended to blow downwards and to blind the field of view of the engineers. At the same time, the Council staff tried to reduce the air resistance of the locomotive for the sake of fuel economy. A new external form for steam locomotives was developed that lifted the smoke clear of the cab windows and the upper part of the locomotive and, in addition, had 35 per cent less air resistance than older forms. This new form was patented in several countries but the Canadian patents were put at the disposal of the CNR and the CPR.

In the early thirties, one use of the wind tunnel was to help Canadian aircraft firms to develop aircraft specially designed for freight or passenger (or convertible) service in Canada's North country. These became the aircraft made famous by the "bush" pilots, and one of Canada's pioneering ventures in the field of transport.

Another important aspect of this work involved the hearty, continuous, much-appreciated cooperation of the Department of National Defence. Officers of the RCAF were sent to the laboratories for long periods to acquire experience in aeronautical testing and research, and aircraftsmen were placed in the engine laboratory, to everybody's satisfaction and profit. A good deal of work was done for federal departments, but the Department of National Defence always headed the list.

In the hydrodynamic laboratory, the towing carriage was also completed in 1931, attaining a maximum speed of 40 feet per second. Accelerations of 31 feet per second per second could be attained. At first this towing basin was used to test aircraft floats, but this use was quickly overshadowed by naval and ship-building requirements. A patrol cruiser of the RCMP, the "Interceptor," was among the first vessels to be improved by model tests before the actual ship was built, and the trial results of the finished cruiser compared very closely with predictions made from model tests in the Council's towing basin.

An aircraft engine laboratory complete with engine-testing equip-

ment was also operating in 1931, with facilities for determining the knock rating of aircraft fuels, and for carrying out many hundreds of other tests.

A historical museum of aircraft engines was begun, which later became the nucleus of the official aeronautical museum of Canada —but only after a war was ended, since wars invariably push such things as museums completely to one side.

The aircraft and allied instrument laboratory, formerly a part of the Physical Testing Laboratory of the Department of the Interior, became a part of the aeronautics group in 1932. This laboratory rendered service to the RCAF, to several provincial government services, and to the Associate Committee on Survey Research. In addition, this laboratory made about a thousand tests a year, mainly for government agencies, including such investigations as the deterioration of radium luminous compounds for instrument dials.

A good deal of work was done on aircraft skis, and some hundreds of technical enquiries were answered every year. It was obvious that aeronautics was a large and vigorous field, and that it would soon have to become a separate division.

The electrical engineering section, under Dr. B. G. Ballard, was at first kept busy making decisions about the various services for the new building, such as water, waste, compressed air, steam, electrical outlets, and telephone service. In addition, special electrical systems were needed for the aeronautical laboratories, the oil-burner testing laboratory, and their own large electrical engineering laboratory. This section also made it possible to carry power from the Council's hydroelectric plant near Rideau Falls into the main building, as a standby in case of power failure, which would have had serious consequences.

However, time was found to assist the RCAF in laying out its distribution system for the new training station at Trenton, and various minor investigations such as the elimination of troublesome static electricity, devising equipment to measure temperatures in aircraft carburetors during flight, and considerable work for the Canadian Engineering Standards Association.

In cooperation with the Department of Agriculture, work was done on the refrigerated transport of poultry and meats, particularly to the English markets. A special defrosting chamber was erected on the Surrey Docks, London, England, to the design and under the

supervision of Dr. L. E. Howlett. This chamber was used for taking refrigerated meat and poultry out of chill, without the deposition of moisture and the consequent damage previously experienced.

The work in optics was initiated by Dr. L. E. Howlett in the autumn of 1931. Foundations were laid for research and standardization in lamp standards, optical methods of measuring temperature, transmission and reflection measurements, measurement of indices of refraction, spectroscopy, and colorimetry.

A complete photometric laboratory was equipped and used to calibrate lamps for horizontal and spherical candle power. Many hundreds of lamps were tested for the Department of Trade and Commerce. In cooperation with the Department of Agriculture, facilities and methods of egg candling were considerably improved. For the Department of Customs and Excise, a photo-cell apparatus was developed for grading sugar solutions. Equipment was designed and built to test photographic emulsions for the Topographical and Air Survey Bureau. Spectroscopic tests were begun for industry. The intensity and variation of north sky light were measured to provide information for architectural and building projects.

The fire hazard testing laboratory, under Dr. J. H. Parkin and T. H. Doherty, began its work in 1931 by testing domestic oil burners. Requests from manufacturers soon broadened the work to include such items as hydrants, valves, sprinklers, extinguishers, and safes. This laboratory made it unnecessary for Canadian manufacturers to secure approval of a foreign laboratory. Manufacturers from the United States also submitted burners for testing, to have access to the Canadian market.

Standards for oil burners were drafted in cooperation with the Canadian Engineering Standards Association, and an Associate Committee on Fire Hazard Testing was organized. The work expanded to take in such things as acetylene generators, dry cleaners' solvents, and inhalators.

The heat laboratory, under Dr. C. D. Niven and Dr. J. D. Babbitt, began by testing the thermal conductivity of diatomite bricks for the Department of Mines. Building boards and blankets were tested for the Associate Committee on Heating and Insulation, and this work quickly expanded to tests of house insulation, samples of walls, and clothing.

Work was begun on determining the temperature in railway

refrigerator cars, and this led to a belief that the standard charcoal heater was the real source of the trouble. A new, improved heater for refrigerator cars was designed, tested, and adopted, first in Canada, and then in the U.S. railways.

Instrument and model shops were established to make one-of-a-kind apparatus and equipment not on the market and which experience had shown it was unsatisfactory to have made in outside shops. Shop staff and equipment of the Physical Testing Laboratory of the Department of the Interior were transferred to the shops of the Council. These shops did a considerable amount of work for government departments as well as for the Council.

The ballistics group, under Dr. D. C. Rose, developed a portable, photo-electric cell method for measuring the velocity of projectiles from field guns. Very good results were obtained, velocities being measured with a probable error of about two feet per second in velocities of the order of 1600 feet per second. This apparatus was altered to apply to bullets at higher velocities (up to 5500 feet per second).

Research on radium and radiology was begun by Dr. G. C. Laurence, for tests on all kinds of equipment used in medical radiology, with the aid of primary radium standards and X-ray equipment. Radium preparations were measured, tested, and certified. Radium from Great Bear Lake was tested for mesothorium and found to be practically free from this objectionable impurity; this source of usable radium broke the world monopoly held by Belgium. Many measurements were made for the Associate Committee on Radiology.

Radio observations, under Dr. D. C. Rose, included a study of ionization in the regions of the upper atmosphere from which radio waves are reflected, during the total solar eclipse of 1932. The three main problems of the day were atmospherics, measurements and standards, and wave propagation. Work on direction finders and antennas had to wait until staff could once more be hired. Many types of radio receivers were tested. Dr. J. T. Henderson took over this work in 1933, with special emphasis on standards, setting Dr. Rose free to develop his grid-controlled discharge tube as a light source for recording purposes, in conjunction with a rotating drum camera for short time intervals—a device arising from his work on ballistics.

Dr. Rose also began the study of atmospheric electrical effects, particularly the electric charges built up in thunderstorms. He was particularly taken with the unexplained separation of electrical charges in thunderclouds—information that could be valuable for aircraft use. He also contributed to the elimination of static electricity in aerial cameras.

The electrical measurements laboratory began under A. J. Grant, assisted briefly by K. A. MacKinnon, who was replaced by J. S. Johnson. Types of electrical meters were submitted to the Council for approval of type to enable them to be used in Canada. Moisture testers for grain, submitted to the Division of Biology and Agriculture for competitive tests, were examined to assess their characteristics as physical instruments. All types of instrument transformers sold in Canada were examined. Resistances were adjusted and certified to enable the radio section to test radio receivers as requested by the Canadian Radio Broadcasting Commission. In addition to a wide range of routine tests, the laboratory constructed a primary standard mutual inductance.

Work on acoustics was done by Dr. G. S. Field, who began by measuring vibrations in rods, leading to measurements of the coefficient of solid viscosity, which was important in the heat treatment of metals. In 1933 he surveyed a number of acoustical laboratories in the United States, and then established the Council's acoustic laboratory, to test the acoustic properties of various kinds of building materials. The work expanded to include microphone calibration and the acoustic testing of radio receivers and of exhaust silencers for aircraft.

The Cliff Street Physical Testing Laboratory of the Department of the Interior was transferred to the Council in 1931 and became the metrology and allied instruments section, with some contributions of staff and equipment to the aeronautics branch and to the instrument and model shops, as previously noted. The metrology and allied instruments section was led by R. H. Field and W. J. Linford. The Dominion standards of weight and length were transferred to this section.

Assistance was given to the Geodetic Survey and considerable work was done in cooperation with the Associate Committee on Surveys. Thousands of tests were run, mainly for federal departments, on such things as thermometers, hydrometers, air cameras,

screens, tapes, transits, levels, etc. Gas meters were examined for approval of type. Several legal standards were tested on an international basis with the national bureaux of the United States, Great Britain, Germany, and Poland.

The two platinum-iridium legal standards of the pound were found to differ by about one part in four millions from the weight found in 1874, when they were compared in London with the Imperial pound standards. A beginning was made on applying interferometry to gauge measurement. A radial-stereoplotter was completed for the Department of National Defence. An improved form of parallax-measuring stereoscope was designed and built for the Geological Survey.

In the metrology laboratory, an annual class of pilot and camera operators of the RCAF attended for instruction in calibration and characteristics of aircraft instruments and aerial cameras.

(The enthusiasm and energy of Dr. R. W. Boyle, Director of the Division of Physics and Engineering, especially in getting these various groups established, constitutes a gleaming highlight in the early days of Canadian physics. From his carefully selected staff eventually grew the six separate NRC divisions of Pure Physics, Applied Physics, Radio and Electrical Engineering, Mechanical Engineering, Building Research, and the National Aeronautical Establishment.)

Research Information

The Division of Research Information, under the directorship of F. E. Lathe, collected and distributed information on scientific and technical subjects, principally for the Council's own laboratory staff but also for those working with financial assistance from the Council in outside laboratories and for independent research workers throughout Canada. They also issued the Council's Annual Report and various other reports and technical bulletins.

Collection of information was chiefly through the National Research Library, staffed by Misses M. S. Gill, E. Twohey, and D. Y. Willoughby, which provided accommodation for the Library of the Royal Society of Canada. It was not a good time to start a new library, because of the depression, but the National Research Library made do cheerfully by extensive borrowing from Canadian

and foreign libraries and in return was able to assist about half as many libraries as they borrowed from.

The Publications section was begun under Dr. W. W. Thomson and Miss D. DesBarres. Dr. J. Stanley served this section for a year, Dr. G. A. Ledingham served for a year, and J. M. Manson joined the group in 1935. Their main publication consisted of the *Canadian Journal of Research*, which grew from two to four sections during the period.

Throughout the period of 1931 to 1935, the Research Information Service was served by F. E. Lathe, S. J. Cook, Mr. A. C. Halferdahl, Dr. C. A. MacConkey, Dr. R. Ruedy, and Miss M. E. Whalley. Their services were varied. Minor questions could be answered readily, but queries from Council staff, from committee members, university workers, and industrial investigators frequently involved them in exhaustive studies of the literature. An impressive number of comprehensive reports with extensive bibliographies was produced in a steady stream. These ranged from "Alcohol Fuel in Internal Combustion Engines" by A. C. Halferdahl to "Virus Diseases" by M. E. Whalley.

Original work was occasionally undertaken along lines intended to develop profitable avenues for further research on subjects relating to industrial and commercial undertakings in Canada. An economic study was made of the availability of raw materials, principal factors entering into costs of production, markets and prices for the finished products, etc. For example, a survey was made of the uses and markets for digitalis grown on the Pacific coast. But the most important services continued to be those involving searches of the literature.

The group on Outside Research Activities consisted mainly of F. E. Lathe, S. J. Cook, and Mr. A. C. Halferdahl, but they were joined in 1935 by A. F. Gill and J. M. Manson. These members of the staff were assigned technical responsibilities and secretarial duties for about 30 research and advisory committees and about 100 assisted researches in laboratories outside Ottawa. They produced the annual reports on all these activities. They performed the same services for conferences, large and small, the largest being the Fifth Pacific Science Congress held in Victoria and Vancouver in 1933. The Proceedings of this Congress were prepared by S. J. Cook and published, in five volumes, in 1935.

(This division was scattered and disbanded during General McNaughton's presidency; reconstituted and re-formed during Dr. C. J. Mackenzie's presidency; scattered and disbanded under Dr. E. W. R. Steacie's presidency, and then partially restored; and dispersed once more under Dr. B. G. Ballard's presidency. Throughout all these changes in outward form and in nomenclature, the actual work continued to evolve into such services as the National Science Library, the Technical Information Service, the Liaison Office, the International Relations Office, the National Science Film Library, and several other services.)

During this five-year period of reconstruction and organization from 1930 to 1935, the Council members carried great burdens, responsibilities, and frustrations, but through it all and sustaining Dr. Tory in these difficulties was the satisfaction of being in at the actual birth of the laboratories, and to see the laboratories operating, in the service of Canada, exactly as he had envisaged and foretold.

(Having chosen his directors, Tory then set about filling, not the senior positions, but the junior posts. He knew that the best way was to use the top young people, with rapid promotion to fill the intermediate positions. In this he was aided by the accident of the depression, which made it possible for brilliant young people to be obtained for very small salaries. Later, this unusually structured staff formed the backbone of Canada's scientific war effort; the brilliant young men of the thirties became the strong leaders of the forties and fifties. But they became a problem in the sixties because so many of them retired at the same time.)

The following letters reflect the temper of the early thirties and the accomplishments realized under such hard and heavy circumstances.

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DOCUMENTS

RELATIONS WITH MINISTERS OF TRADE AND COMMERCE

TO H. M. TORY FROM C. F. MARTIN (MCGILL UNIVERSITY), MONTREAL, 21 FEB. 1930

Professor Tait, of the Department of Physiology, wondered if it were

possible to get a scholarship for a man working on Deafness and tests therefor, and asked me if I would write to you along those lines. I consented to do so, although I have the impression that your funds are not available for work of that kind. In any case, I shall be grateful for some word on the matter.

I had a visit from A.B., who wanted to make mischief, but I did not encourage him. On the contrary, I told him that McGill could look after herself, and that we were not going to worry about those trifles. . . .

TO C. F. MARTIN FROM H. M. TORY, OTTAWA, 1 MARCH 1930

. . . There is not the slightest reason why a graduate student should not apply for a Bursary or Studentship in the department of physiology, if he possesses the necessary qualifications and the problem can be outlined in such a way as to appeal to the Scholarships Committee. Of course, I could not assure Tait that the scholarship would be granted, as we have about three applications for every scholarship available. Tell him to try anyway. He will find application forms in the Registrar's office.

With regard to A.B., I have been having a very nasty time with him. He has written to the Minister that I went down to Montreal and persuaded the MeGill authorities to ask for his removal. I replied to the Minister that this was utterly false; that on at least three separate occasions I had been asked by the McGill authorities whether he and Dr. Ruttan could not be replaced on the Council; that I had replied that it was a very delicate situation for me and that the initiative would have to be taken by McGill herself; further that last winter the matter was again discussed, and I suggested that there were two ways in which this object might be accomplished—one would be for McGill to ask the men in question to resign, and the other was to ask the Government not to reappoint them. He claims that he was not appointed from McGill, but from Toronto, and he has charged me with having dismissed him from the Council and, in general, with acting in a thoroughly autocratic way. There the matter stands.

You will recall that in the beginning he and McLennan were appointed from Toronto, and Adams and Ruttan from McGill, so that with Adams and MacKay from McGill, she stands exactly where she was before.

I don't know whether I told you that after your letter was received by the Committee of the Privy Council they laid down the general regulation that university professors who are retiring from their positions would automatically retire from the Research Council on the completion of their term of service. This will affect Adams as well (unfortunately

for me), who will retire at the end of the present year. I hope to see another younger man appointed from McGill when he retires.

I understand now that A.B. is trying to get the universities to believe that I have been working to their disadvantage. It is hardly necessary to say that this is wholly false. I have been trying to bring in to the Council men whose interests are in the universities as well as in the industries. This will slowly work itself out, I am sure. . . .

TO H. M. TORY FROM C. F. MARTIN, MONTREAL, 27 MARCH 1930

Thanks so much for your letter re Physiology Scholarship—which was forwarded here.

I am distressed that you are being irritated by A. B. Macallum over his place on the Research Council. It is a shame that he should accuse you of trying to influence McGill authorities to displace him as I know you never did so; I hope you will show this note to any Cabinet Minister who seems to believe you have used any influence against either Ruttan or Macallum.

It is my personal opinion that inasmuch as Ruttan had severed his connection with McGill and that Macallum had retired from active scientific work, their places should have been taken by younger men in the active field. . . .

TO H. M. TORY FROM THE HON. JAMES MALCOLM, OTTAWA, 2 MAY 1930

Thank you for your letter of April 25th, enclosing one from Dr. Charles F. Martin.

I will keep this before me when the estimates come up in case anything is said regarding the Macallum complaint.

TO THE HON. JAMES MALCOLM FROM H. M. TORY, OTTAWA, 7 JUNE 1930

The two things which I suggested to you the other evening as points to be emphasized with regard to research work and about which you asked me to write you a note, are the following:

I. That it is the intention of the Government to put within the reach of the productive agencies of the country, both agricultural and industrial, the last word which science has to offer so as to make it possible to produce effectively the requirements of the Canadian market and to make it possible to compete on equal terms in the markets of the world. This service, that is the service of the National Research Laboratories,

is offered fully and freely to our industrialists to assist them to improve their products and cheapen their costs of production. An illustration of how this can be done can be taken from the magnesite research. The people conducting the magnesite industry came to us when their business was in a bad way following the war. They asked for tariff. Instead, the Government gave them the benefit of the research facilities at their disposal, with the result, first, the quality of their product has been greatly improved, second, the output per unit of power has been increased, third, they have been able to not only absorb the market in Canada, but to enter the American market successfully competing in spite of a $7.00 per ton tariff. They are now extending their markets to Great Britain. Fourth, a large body of waste material is now being turned to useful purpose.

The foregoing might be coupled up with a statement that this scientific help is being given in addition to the reasonable tariff under which the industries are now operating. The main point, however, is to issue a clear statement of intention to put Canada scientifically in relation to industry on a par with any other country of the world.

I think you might further add a word with regard to the quality of the men that are being secured. We are searching the whole field of science for men of high quality and are succeeding and attracting some of the ablest young Canadians abroad back to work in Canada.

II. The other point which was mentioned was that you might see fit to state that it was the intention of the Government to make a thorough scientific survey of the raw materials available in Canada for industrial use, in order that not only our home markets should be supplied with our own products as far as possible, but that products made from Canadian raw materials should be put on the very best competitive basis possible in the markets of the world. . . .

TO H. H. STEVENS FROM H. M. TORY, OTTAWA, 12 DEC. 1930

I have been hoping all week that I could get an appointment to discuss some rather urgent matters with you. I know how terribly busy you are, but there are two or three important matters that should be dealt with immediately. I have been wondering if it would be possible for you to take lunch with me at my house on Saturday at one o'clock and spend an hour with me in visiting the laboratories as well; or, if you would prefer, I should like to have you come on Sunday at noon, perhaps keeping part of the afternoon free for the discussion of matters that have to be dealt with. I would be grateful indeed if you could adjust your timetable to one of these dates.

I am having the whole staff of the Research Council in at my house this evening at eight o'clock for a little party. If at any time during the evening you could drop in, even for half an hour, it would give you an opportunity of meeting the staff and seeing the sort of men they are.

TO H. M. TORY FROM H. H. STEVENS, OTTAWA, 12 DEC. 1930

I am very very sorry that I cannot accept your invitation as I am just at my wits' end preparing for the visit of the Australian Delegation who will reach Ottawa tomorrow morning. Also the Prime Minister is returning and I fear my time will be more than fully occupied for the next week. I am exceedingly sorry that I cannot respond to your request.

TO H. H. STEVENS FROM H. M. TORY, OTTAWA, 22 JAN. 1931

You will find in your office a loose-leaf binder containing minutes of the meetings held by the Committee of the Privy Council on Scientific and Industrial Research. A copy of these minutes will also be found in the offices of the other members of the Privy Council Committee. Until the decision was reached to establish the new Laboratories, these meetings had been informal. It was then decided, as you will see by the minute of the meeting held on April 5th, 1929, that, unless otherwise ordered, meetings should be held on the first Wednesday of every month in the office of the Minister of Trade and Commerce and that regular minutes should be kept. While it was not found possible to hold monthly meetings due to various causes, the Committee met when necessary to deal with major problems when they arose. In my opinion it is extremely important that this practice should be continued, in order that the members of the Committee of the Privy Council may be thoroughly familiar not only with the general policy of the Council but with the more important projects which are being carried out under its auspices.

As you are aware, for good reasons the Privy Council Committee has not met since the present Government took office. I would respectfully suggest that it would be wise to have a meeting of this Committee at the earliest possible moment, as in no other way are the members of the Committee likely to secure accurate information concerning the plans and activities of the Council. . . .

TO H. H. STEVENS FROM H. M. TORY, OTTAWA, 6 APRIL 1931

. . . During your absence the question of our vote was up for discussion, and I was asked to reduce it and finally did reduce it to the exact amount of last year. This, of course, will mean a great reduction in our

external activities. I have not heard from Dr. Manion whether that estimate has been accepted, but I hope nothing will be done to reduce the amount further, as I do not see how we can manage on any smaller vote. Our Department, as you know, is not like the older Departments that already have a complete staff. We were really in the midst of organization when the depression came upon us. . . .

TO H. M. TORY FROM K. G. CHAMBERLAIN,* OTTAWA, 27 APRIL 1931

The Minister instructed me to forward you the enclosed memorandum for your consideration, re beryllium, as he thinks it is a matter of real interest.

MEMORANDUM

From
The Canadian Government Trade Commissioner
44 Whitehall Street
New York

Beryllium

. . . From time to time enquiries are received as to the availability in Canada of supplies of Beryllium. Negotiations have been carried on with the Manitoba Department of Mines and the Jack Nutt Mines, but up to the present it has not been possible, for lack of capital, and other reasons, to develop supplies of beryllium in sufficient quantities to make shipment possible commercially.

The Manitoba deposits appear to offer the best prospects for development. Recently Dr. T. L. Walker, Professor of Mineralogy at the University of Toronto, reported the discovery of a large and valuable deposit of beryl one hundred miles north of Winnipeg, which he said was the most promising he had ever seen anywhere in the world and was of outstanding possibilities and worth intensive development. . . .

TO K. G. CHAMBERLAIN FROM H. M. TORY, 30 JUNE 1931

I am sorry your note with the memorandum regarding beryllium has remained so long unanswered. I had to have a number of documents looked up to find out how the matter stood. . . .

There is no doubt that Canada may become a most important source of both beryllium and lithium. In the opinion of the experts on our staff this, however, is likely to be a development requiring some years. It is not likely to be large enough in the near future to justify treatment of

*Private Secretary of the Minister of Trade and Commerce.

these ores in Canada, and owing to the distance of the deposits from ocean transportation, freight rates on ore are likely to be high. This is particularly important in view of the low atomic weight of these metals, as a result of which the best ores contain only a small percentage of pure metal.

In press reports and other statements on the use of the metals the point has been stressed that they are of particular value for aeroplane alloys, due to their extremely low specific gravity. As a matter of fact I do not regard this fact as of great importance since most of the alloys of aluminum contain other alloying metals in comparatively small proportion. In fact, only limited amounts of these metals are likely to be available so that large-scale uses are hardly to be expected. It is quite possible, however, that beryllium and lithium have certain specific effects on aluminum which may not be readily duplicated by other metals which are available at much lower cost.

As I have said, the Department of Mines have already examined the deposits and I have no doubt they are in a position to give advice to owners regarding the development of these mines. The only way in which we could help would be in the study of methods of the extraction of the mineral from the ore. The best methods at the moment appear to be in German hands. Methods of lithium extraction are better known than those of beryllium, but both present difficulties.

We have been keeping the matter under observation and will be ready to take action with regard to scientific studies, should it appear that useful work could be done.

TO H. M. TORY FROM H. H. STEVENS, OTTAWA, 4 JULY 1931

In reference to your letter of the 30th June regarding beryllium, I confess that I think you have missed entirely the point in the enquiry of our Trade Commissioner in New York.

The point in the whole matter is this, that our Trade Commissioner sees an opportunity for the marketing of beryllium. In your letter you take pains to say that we have abundance of beryllium but that some expert at some time in the past thought it would be years before it would be possible to develop it. Our communication, however, brought in a new factor, viz., that there *appears to be* an opportunity for marketing, and our desire is to get some co-operation from some source in bringing these two factors together, hence our letter to you.

I presume it will be necessary now to take it up with the Mines Department direct, or possibly with the Government of Manitoba. I had hoped for some co-operation.

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 7 JULY 1931

. . . I frankly confess that I was greatly disturbed by both the contents and the tone of this letter, and I was somewhat at a loss to know just what action to take under the circumstances. . . .

Lathe and I have both been racking our brains to discover just what prompted the Minister to write this letter. It is true that your letter is somewhat indefinite in that it does not quote exact figures or make definite recommendations, but we feel that this is not in itself an explanation of the problem.

There is, of course, the question of the delay of 2-1/2 months in replying to the Minister's communication. . . .

You will be pleased to know that the Minister has approved of the appointment of Mr. Green to supervise the installation of the equipment in the Chemistry Division of the new Laboratories. Chamberlain also told me that he has approved three of the four sub-professional appointments requested by Boyle. The remaining one of these appointments is that of Cracknell as Instrument Maker. He was formerly of the Interior Department staff, and Chamberlain informed me that there is a point regarding this man which is to be checked up before approval is given. The recommendations regarding appointments in connection with investigations for the apple industry and the asbestos industry were submitted to the Minister's office yesterday, and obviously there has not yet been time for action to be taken. . . .

INTERVIEW BETWEEN THE HON. MR. STEVENS AND H. M. TORY, 25 MAY 1931

. . . I also discussed with Mr. Stevens the question of transferring the Physical Testing Laboratory from the Department of the Interior to our Laboratories. He expressed himself as agreeable to our taking over the work of this Laboratory, provided it could be properly financed out of present estimates. . . .

I also discussed with the Minister the question of going forward with the establishment of testing laboratories, with a view to our doing work for Canadian industries which was now being sent to Chicago. I pointed out that we were receiving many applications for testing which we could not at present undertake, for example, the application from Vancouver for testing fire extinguishers, the applications from both Vancouver and Montreal for testing oil burners, the application from Toronto for testing lenses for railway headlights and signal lights, etc. Mr. Stevens instructed me, so long as we kept within our estimates, to go forward with plans

for setting up equipment for this class of work, as he was anxious that work for Canadian industries should be done in Canada.

I also submitted to Mr. Stevens the question of the appointment of Dr. Newton and left with him a set of documents covering the case. Mr. Stevens expressed the desire of discussing the matter further with the Prime Minister before reaching a decision. I told him I would be in a rather embarassing position if Dr. Newton's appointment did not go through, as it had been arranged three years ago and we had taken part of his time from the university where he is employed, for which we had paid him an honorarium. The Committee of the Privy Council on Scientific and Industrial Research under the former Government had authorized me to bring him to Ottawa as soon as he could be freed from the many obligations he had undertaken in Alberta.

I then called the attention of the Minister to the fact that the Committee of the Privy Council on Scientific and Industrial Research had not met since the formation of the new Government and that I was anxious to have a meeting. I suggested that as the Order-in-Council appointing the Committee did not mention individuals but only official positions, probably the Committee might be regarded as still in existence unless the Government wished to appoint a new Committee by a special order of their own.

I further said that I doubted the wisdom of holding a meeting of the Research Council until the vacancies in its membership were filled, although there was rather urgent business awaiting the calling of a meeting. He assured me he would have these two matters attended to as soon as possible.

With regard to estimates, I informed the Minister that certain appointments to round out our present staff ought to be made, and asked him whether I could go ahead and make provision for such appointments so long as I kept within the estimates now being submitted to Parliament. He informed me that in a general way I might do this, but that the whole question of expenditure would have to be carefully considered, even though the money were voted by Parliament.

The Minister expressed himself as satisfied with the form adopted for the title page of the Canadian Journal of Research, and stated that he did not wish his name to appear thereon. . . .

TO H. M. TORY FROM H. H. STEVENS, OTTAWA, 8 JULY 1931

It has been brought to my attention that the National Research Council gives a month's holiday to their employees.

This is not in accordance with Government practice. The maximum

allowed in any Government office is three weeks and I must, therefore, bring before you a definite request that the Research Council bring their practice in harmony with the rest of the Service.

TO H. H. STEVENS FROM S. P. EAGLESON, OTTAWA, 9 JULY 1931

In Dr. Tory's absence I wish to acknowledge receipt of your letter of July 8th with reference to the holiday regulations adopted by the National Research Council.

It would appear that you have received either incorrect or incomplete information on this subject. May I therefore respectfully submit the attached memorandum outlining the reasons which prompted the National Research Council to adopt its present leave regulations. These may be very concisely summarized as follows:

1. It is not feasible to operate research laboratories efficiently with four o'clock closing during the summer months.
2. The staff of the National Research Laboratories actually worked until five o'clock all last summer, although holidays were computed on a three weeks' basis.
3. The staff of the National Research Council is required to work longer each year under the regulations approved by the Council than is the Civil Service at large under the regulations of the Civil Service Commission.
4. The majority of the staff of the Council would prefer four o'clock closing, and the present regulations have been adopted entirely in the interest of increased efficiency.

For your further information, may I say that it has always been the fixed policy of the National Research Council in matters of staff administration to follow the same regulations as are provided for the Civil Service at large whenever this is feasible. In cases where there appears to be sufficient reason to vary the routine regulations of the Civil Service Commission, care has always been taken that the privileges granted by the Council were not more generous than those granted under the Civil Service Act.

Might I respectfully request that after you have considered the facts presented, we be advised whether it is your desire that the instructions contained in your letter of the 8th instant should stand.

TO H. M. TORY FROM S. P. EAGLESON, OTTAWA, 11 JULY 1931

. . . the instructions contained in his [H. H. Stevens] previous letter are to stand. . . .

TO S. P. EAGLESON FROM H. H. STEVENS, OTTAWA, 24 SEPT. 1931

I learned today that you have authorized a Miss —— to proceed for an extended research into honey production in Europe. Surely this is not the time to send out costly research parties, and this, in my estimation ought not to have been done without receiving the approval of the cabinet committee.

We are endeavouring to restrict our expenditures to a minimum and on the face of it this appears to be a wholly unnecessary expenditure.

I would like an explanation.

TO H. H. STEVENS FROM F. E. LATHE, OTTAWA, 26 SEPT. 1931

. . . It is true that Miss —— is on her way to Europe, where she hopes to pursue further her researches on honey, but as far as I know Mr. Eagleson has taken no action whatever in the matter since he has been absent from the office on account of illness since August 21. As Dr. Tory is away Miss —— consulted me in the matter, but I did not authorize her to go to Europe, nor has it even been suggested that we should pay the cost of her trip or her expenses while there. She is travelling on her own time and at her own expense. In these respects it would therefore appear that your informant has not been fully acquainted with the facts.

To explain the situation in detail, I may say that Miss —— received a temporary appointment under the Council's Associate Committee on Honey in the spring of 1929, and has since then been working under the direction of Dr. Lochhead, bacteriologist at the Experimental Farm, on problems of honey fermentation. . . .

In her work under Dr. Lochhead it has been discovered that there are in honey activators which promote fermentation and Miss —— proposes to study these newly discovered substances under an outstanding authority in Stockholm, Prof. Hans von Euler, a Nobel prize winner in biochemistry. Dr. Lochhead strongly favours such study and believes that Miss —— can make better progress there in her work on this important problem than would be possible in Ottawa. Since the problem is one which the committee desires to follow up Miss —— has inquired if the committee could continue her salary until the middle of February, the date to which her appointment has been authorized. . . . I may add that if Miss ——'s salary is not continued she will feel compelled to change her plans in order that they may involve less expense to herself and she will then proceed with her studies in England or Germany on

other subjects than the special problem mentioned above. From this point of view it seems desirable that her salary be continued. . . .

TO F. E. LATHE FROM H. H. STEVENS, OTTAWA, 28 SEPT. 1931

I have your letter of the 26th instant regarding Miss ——. I regret very much to say that from the explanation contained in your letter, I cannot see any justification for going to the expense of paying Miss ——'s salary while she is on this trip, apparently largely as a student continuing her studies and only incidentally dealing with the problem referred to. . . .

TO H. H. STEVENS FROM H. M. TORY, OTTAWA, 4 DEC. 1931

I hope you will not object to my calling your attention to a matter that is giving me anxiety at the moment, that is, the question of completing the membership of the Research Council. As you know, the Research Council Act provides that appointments to the Council shall be for a period of three years and that not less than four members shall retire each year. It also fixes the schedule so that only one-third of the Council shall be appointed annually. It is now eight months since the last four members retired. It seems to me necessary that action should be taken promptly, or we shall find ourselves at the end of the year compelled to appoint nine members instead of five. This would place us in a position which would make it impossible for us to comply with section 4, subsection 2 of the Research Council Act.

Further, as you know, the Act requires that we shall have four meetings a year. You will also recall that you authorized me to call together the present membership of the Council some time ago. which I did on August 21st last. This means that we have had only one meeting in eight months, and it will be necessary for us to have three more meetings in the next four months in order to fulfill the requirements of the Act.

I know certain members of the Council are uneasy because a meeting has not since been called. It would be unfortunate if the members should get the impression that they were being ignored in carrying on the business of the Council. I believe this to be a real danger, and fear that I shall find myself personally accused of acting autocratically in matters which should properly be referred to the Council. For example, I have had no opportunity of discussing the estimates for next year with the Council before submitting them to you.

I am exceedingly anxious that the appointments to the Council should

be made before you get away, so that I may have a meeting of the full membership either before Christmas or between Christmas and New Year's. Otherwise, I would ask your authority to call meetings of the present members in order to comply with the Act. I am taking the liberty of enclosing a draft recommendation to Council ready for your signature except for the filling in of the names, in order that there may be no delay after you have reached a decision as to the personnel.

MEMORANDUM OF INTERVIEW BETWEEN THE HON. H. H. STEVENS AND H. M. TORY, 25 FEB. 1932

. . . I presented to Mr. Stevens the present state of our estimates for the next year, and pointed out that the reduction to $410,000 had practically made it impossible for us to undertake any new assisted researches during the coming year and also made it impossible to spend $40,000 on scholarships as we had done last year and at the same time maintain our staff even as at present constituted. It was agreed between us that it might be wise to offer no new scholarships, but merely to maintain for a second or third year such of the present holders as were deemed suitable. . . .

I stated that I especially wished to complete the oil burner testing equipment, and Mr. Stevens agreed that this should be done.

I informed the Minister that I had had a conference with the fire underwriters regarding the establishment in our laboratories of a testing system which would enable us to undertake for Canada work now being done in Chicago and that while at first the fire underwriters had some doubt as to the wisdom of their making the transfer, they heartily agreed to give us every support in the work. . . .

I pointed out that it would be almost impossible to do anything during the coming year in the way of setting up these laboratories unless a special vote for equipment were provided in the estimates of the Public Works Department. . . .

Some time was devoted to the question of superannuation. I pointed out to the Minister that our difficulty arose from the fact that the Superannuation Act had been devised partially as a scheme for keeping men in the Service, since if they left before ten years of service they received no benefit from the scheme, and that such a principle was absolutely in opposition to what we desired. We want freedom in eliminating from the staff undesirable persons, especially in the technical divisions. Also, we desired to push out into industry men who carried out a piece of investigation in connection with industry. I gave him a short sketch of

the history of our relation to the Auditor General's Department on the subject, and suggested that some plan ought to be devised by which when men were let out they would receive the money which had been withheld from them. Mr. Stevens was sympathetic with the idea. . . .

MEMORANDUM ON A CONVERSATION OF H. M. TORY WITH THE HON. H. H. STEVENS IN HIS ROOM IN THE HOUSE OF COMMONS, 1 MARCH 1932

I spoke to Mr. Stevens regarding the vacancies in the membership of the Research Council and told him that after March 31st there would be only four members remaining. I stated that I was the only person now on the Scholarships Committee, and suggested that I be permitted to bring up to the meeting on the 29th Dr. A. S. Mackenzie, who had been chairman of the Committee and whose appointment was awaiting confirmation. To this he agreed. . . .

With regard to the opening of the new laboratories, the Minister suggested that we do not invite foreign guests, and that if I would prepare a programme for the occasion he would submit it to the Privy Council. He suggested that I put in both Mr. Bennett and Mr. King to give short addresses. . . .

I raised with the Minister the question of the possibility of Dr. Robert Newton being appointed Deputy Minister of Agriculture, stating I believed it would bring tremendous prestige to the Department so far as western Canada was concerned. He suggested that I speak to Mr. Bury about it and that possibly Mr. Bury would speak to the Minister of Agriculture and to the Prime Minister.

TO H. M. TORY FROM H. H. STEVENS, OTTAWA, 16 APRIL 1932

Sometime ago I forwarded to you a letter received from Mr. —— of Vancouver, regarding a scholarship for his son. In your reply of March 15, you said:

> We have had our vote for scholarships severely cut this year, and at a recent meeting of the Research Council, it was decided not to grant any new scholarships, but to try to carry forward the best of those already holding awards so as not to lose the advantage already gained in their training. If this resolution is carried out, it will prevent Mr. —— from receiving a scholarship. However, the matter will receive very careful consideration when the Committee meets.

This of course I accepted in perfect good faith, but to my amazement I learned that seven new scholarships were granted. . . .

The only reason I drew the —— letter to your attention was that it might be carefully checked up and if this young man was, as the letter indicated, worthy of consideration, he should have been given consideration along with the others.

Another point that has caused me some anxiety is this. In February last, you wrote me regarding a young man called ——, who graduated in Ceramic Engineering from the University of Washington, and whose father is one of the largest and oldest established manufacturers of pottery and tableware in British Columbia. At that time you advised me: "As you probably know, work in ceramics is under the direction of the Mines Branch, and we are not permitted to do anything in that field as they have been exceedingly sensitive on that point. I am afraid therefore there is absolutely nothing under the Research Council that Mr. —— could do.

I am now informed that a ceramic engineer in the employ of the Research Council is carrying on investigation on refractories in the Mines Branch laboratories. If this is so, I find it very difficult to understand the quotation above from your letters of February 12. I would not for a moment suggest to you that any consideration should be given to these young men unless they had full merit and were worthy of it, but it does seem to me very strange that their cases could not have been considered.

Another matter has been brought to my attention which I view with some anxiety, and that is purchases of furniture, rugs, etc., for the new buildings. These, I understand, are being purchased at very high cost and in these days we must keep our expenses down to a minimum and I would, therefore, suggest that such purchases should be placed before me before the orders are given.

I submit there should be closer co-operation between this office and your own in matters of this kind.

TO H. H. STEVENS FROM H. M. TORY, OTTAWA, 27 APRIL 1932

. . . When the applications were examined it was found that the number of those applying for *second year scholarships* was less than half the number that applied last year, several of the best men having apparently applied for the Royal Society scholarships (awarded under the Carnegie grant) which were approximately double the value of ours. . . .

Every case, including Mr. ——'s, was given full and careful consideration, each individual case being studied on its merits and in comparison with the other applications. The whole list was gone over five times so as to secure an impartial judgment. . . .

With regard to the case you refer to—an engineer in the employ of the Research Council carrying on refractory investigation in the Mines Department Laboratories, the facts are as follows: . . .

He is not an employee of the Research Council, and as soon as the task upon which he is engaged is finished he will cease to work under the Committee. As I said before, the work is not strictly ceramics, but is part of the very large investigation for the magnesite industry which is now drawing to completion. . . .

As stated in the fourth paragraph on page two of your letter, I know you had no desire that "any consideration should be given to these young men unless they had full merit", but I am sure that after reading this letter you will feel it is hardly justifiable to say "but it does seem to me very strange that their cases could not even have been considered."

With regard to the purchase of furniture, I am exceedingly sorry if in the purchase of furniture and rugs for the new building I have caused you anxiety. The only furniture that has been purchased that could in any sense be called expensive was furniture for the Board Room, consisting of a table 18 feet long which had to be specially made, 20 chairs and two small side tables, and the furniture for my own office, which consisted of a desk, a small side table, two chairs and a couch. Two additional tables were specially made for two committee rooms at a moderate price. All the other material purchased is of stock type and certainly not of an expensive character.

With regard to the rugs, only two were purchased. These were not one-piece rugs, but were made up from ordinary yard carpet, one for the Board Room floor and one for my own office.

The special furnishings for the Board Room and my own office were made by Castle and Son of Montreal, a firm which had previously made a considerable amount of furniture for the Government. Before any of the orders were placed, the matter was submitted to the Public Works Department for approval and the costs were checked against previous purchases by the Government and were found to be reasonable. The orders were then placed by the Public Works Department. I did not for a moment think that I was presuming in asking that Department to get the necessary furnishings to make it possible to operate the portion of the building which we will occupy in the course of the next few weeks.

I shall, of course, bear in mind in future that all such purchases must be placed before you before being authorized. I had assumed that the Public Works Department would be at liberty to spend the vote made to them for our building on their own authority, and did not realize that you wanted to take responsibility for such purchases.

May I add that there is nothing I desire more than the closest

co-operation between this office and yours. I have done my utmost to keep in contact with you, and have striven always to conform my time-table to your convenience, but I think you will realize that because of pressure upon yourself it has not always been possible to give me appointments when I have regarded it as extremely important that we should have a conference.

TO H. M. TORY FROM H. H. STEVENS, OTTAWA, 7 NOV. 1932

Since the questions regarding the furnishing of your office were asked we have had a great many letters of one kind or another regarding it. I attach hereto a sample of one that has been forwarded to the Prime Minister. I wish you would come and see me about this matter.

TO R. B. BENNETT FROM W. A. MCKENZIE, VANCOUVER, 1 NOV. 1932

I was listening to the National hook up last night on the $80,000,000.00 loan, and your remarks and those of the Finance Minister, explaining the reason for this loan.

We now understand why it is necessary to have this loan, but in your remarks you stress the fact that rigid economy must be exercised. It struck me as a little out of place, in view of the report which came out in the newspapers a day or two ago of the bill which was placed on the table at the request of one of the members regarding the furnishings of two offices in the National Research Bureau.

To my mind, this bill represented extravagance personified. The amount of money spent on these two offices would, to the ordinary individual in substantial financial circumstances, furnish luxuriously two six or seven room houses. It would be interesting to know who supplied the furnishings for these two offices, and how much profit they made on the transaction.

People today do not go out and purchase $395.00 rugs for their homes, and it says very little for those disbursing the country's funds, that they allow or justify any such ridiculous and extravagant expense.

I am out to keep law and order in every way, but when such things come to the eyes of our fellow citizens who cannot see where they are going to get their next meal, no wonder you have extreme or Red elements in the country.

It would be appreciated if the question could be brought up in the House, or if you would be prepared to justify this extravagant expenditure.

TO B. J. ROBERTS (DEPARTMENT OF FINANCE) FROM S. P. EAGLESON, OTTAWA, 3 OCT. 1932

With reference to our recent discussion regarding the cost of the furnishings in the office of the President of the National Research Council, I was interested in looking up the actual figures. You will probably also be interested in knowing the actual figures on this question in view of the ridiculous rumours which have been prevalent in usually well-informed circles. I am, consequently, enclosing a list of the complete furnishings in Dr. Tory's office, together with the cost of each article. . . .

NATIONAL RESEARCH COUNCIL

Complete List of the Furnishings in the Office of the President

Desk	$260.00
Desk Chair	85.00
Leather Covered Settee	220.00
2 Leather covered chairs at $125	250.00
Side table	165.00
Rug 18′ × 18′	395.00
Window curtains & blinds	135.00
Wastepaper basket	6.25
Total	$1,516.25

MEMORANDUM RE CONVERSATION BETWEEN THE HON. H. H. STEVENS AND H. M. TORY, 10 JUNE 1932

1. I informed the Minister that the meeting of the Associate Committee on Agriculture of the National Research Council had been held in the Board Room of the new building on June 9th, and that I had not received from Mr. Weir the names of his nominees, so the meeting had been held without representatives of the Department of Agriculture being present.

I further informed the Minister that the night before our meeting Dr. Archibald had, without my knowledge, held a conference with a number of the persons who were attending our meeting and had made statements to them which were evidently intended to influence them adversely, that I had noticed during the meeting a certain reticence on the part of members of the committee which I was not able to understand until after the meeting was over when one of the members informed me of what had taken place and gave me the reason for the somewhat difficult position in which I found myself during the day. It appears that Dr. Archibald had informed them that his Minister was adverse to the

Research Council and intended having a committee of his own appointed in due course. In one or two instances a hint was given that the person concerned might be eligible for appointment to this committee. In fact, one of those present at our meeting felt himself greatly embarrassed by the possibility of being compelled to choose between the two committees. It was also hinted that a statement might be made at the forthcoming meeting of the Society of Technical Agriculturists in Winnipeg.

Dr. Archibald also stated that the Department had not received notice in time to take action in the matter and hinted that this was deliberate on my part so as to prevent their representatives from attending. I pointed out that my letter asking for the appointment of representatives of the Department of Agriculture had been written to the Minister on May 11th and that he had written to Mr. Weir on May 13th asking him to name three representatives to the committee from the Department of Agriculture, that again on May 30th I had communicated with him calling attention to the fact that no names had been received by us, and also on June 8th, hoping up to the last moment that the representatives would be present at the meeting on June 9th.

As a consequence Mr. Stevens wrote a letter to the Prime Minister with regard to the matter. . . .

MEMORANDUM ON CONVERSATION BETWEEN THE HON. H. H. STEVENS AND H. M. TORY, 22 JUNE 1932

1. I discussed with Mr. Stevens this morning the possibility of assisting Simms and Company with their dehydrating apple plant. Mr. Stevens suggested I write to Mr. Simms and ask him to get in touch with Mr. Rhodes, who is in Halifax, and authorized me to do everything in my power to assist Mr. Simms. . . .

3. I called the attention of the Minister to the abolition of our positions by the recent Order-in-Council, and received from him the statement that it would be useless to try to get it re-considered, but that as he himself was on the Treasury Board he would do his utmost to get appointments through when desired.

4. Mr. Stevens informed me that no action had yet been taken by Mr. Weir with regard to the Agricultural Committee.

5. I left with the Minister a copy of the memorandum on standardization prepared for Mr. Coats. . . .

7. . . . I informed Mr. Stevens of the recommendation I had made in my report on the apple industry that they request us to call a conference of scientific men in the province to lay out a programme of studies. . . .

8. The question of Dr. Newton's appointment was discussed, and the Minister undertook to have it confirmed at the earliest possible moment. I informed him that this would have to be done before the end of July, as under the recent Order-in-Council the position would be abolished at that time if it were not filled.

TO G. S. WHITBY* FROM H. M. TORY, OTTAWA, 25 AUG. 1932

The Minister visited us yesterday afternoon; he spent a couple of hours going over the institution and seemed to be very much pleased. This morning I received from him a request for a list of all the persons employed by the Research Council, their salaries and the nature of their work, together with the date of their appointment. I am sending you a list of names of the persons on your professional staff as well as those on the non-professional staff, also a sheet for each name with their diploma and standing. I would be grateful if you would make suitable statements on the sheets concerning the work upon which each member of your staff is engaged. I would be glad if you would keep in mind the necessity of making the suggestions appear as practical as possible, emphasizing especially the industrial contacts that are associated with our efforts. We will have them typewritten here, on return. Please do this at your earliest convenience. I am going on my holidays tomorrow, but I am asking that the statements be typewritten and forwarded to me before being sent to the Minister.

TO JOHN SHEARER (DEPARTMENT OF PUBLIC WORKS) FROM S. P. EAGLESON, OTTAWA, 19 OCT. 1932

In compliance with a request received from the Chief Architect of the Department of Public Works, the sum of $12.00 has been collected from the two employees who were concerned in the breaking of glass in the small cottage located at the corner of Sussex Street and Stanley Avenue, and I have pleasure in enclosing this sum for transmission to your Department.

As the money is transmitted in cash, would you please be kind enough to acknowledge its receipt.

TO H. H. STEVENS FROM H. M. TORY, OTTAWA, 27 SEPT. 1932

On my return home today from holidays I found copy of Order-in-Council No. P.E. 247/1912, reducing the per diem allowance authorized

*Director, Division of Chemistry, NRC.—M.W.T.

for me on December 9, 1924—P.C. 2080—from $15 to $10. I am writing this note to assure you that I have not been taking the per diem allowance of $15 since the Order-in-Council reducing the allowance to the Deputy Ministers was made, but have presented accounts covering absolutely only the incidental expenses incurred and these I have kept to the lowest possible amount, even to the extent of taking my meals in restaurants rather than in hotels.

. . . An examination of my accounts will show that when I was away, for say a week or ten days at a time, I only put in a limited number of days at the $15 rate, merely enough to cover actual expenditures.

TO H. M. TORY FROM H. H. STEVENS, OTTAWA, 28 SEPT. 1932

I have your letter of the 27th September. The cut from $15.00 to $10.00 was made by the Treasury Board simply to bring your position into harmony with that of the Deputy Ministers in all Departments. As far as I know there is no criticism whatever. I have heard none, at least, and I quite cheerfully accept your statement in regard to expenses and have no reason to think that they have been otherwise than on the most economical basis, but as stated above, it was thought by Treasury Board advisable to harmonize the rule in this respect.

TO S. P. EAGLESON FROM H. H. STEVENS, OTTAWA, 26 NOV. 1932

I am today in receipt of your letter of the 25th instant to which was attached a Who's Who of the National Research Council scholarships. I naturally was interested in this publication but what immediately struck me was that you were going to a tremendous lot of expense in getting this out without, as far as I can see, any real necessity or merit in it. . . .

TO H. H. STEVENS FROM S. P. EAGLESON, OTTAWA, 28 NOV. 1932

. . . As you are aware, Research Council post-graduate scholarships were established in 1918 after an inventory of the facilities throughout the Dominion for research work had been taken by the Council and had disclosed that one of the greatest needs was to develop a corps of highly trained specialists competent to undertake research. The Who's Who contains a record of the accomplishments of each person in whose training public money has been invested by the Council.

It is important to note that the Who's Who is not issued to justify this phase of the Council's activities. Its purpose is to ensure that as many

of the grantees as possible may find employment in Canada. Only a limited number of copies are prepared and these are distributed to the Presidents and the heads of each major department of science in all Canadian universities and to such industries as request assistance in finding suitably trained men for technical appointments. . . . For your information I enclose a copy of three letters received this morning which indicate that the Who's Who is considered by persons who receive it to be of value for reference purposes when filling vacancies at their institutions and when they are consulted regarding technical appointments in industry.

The cost of the document this year was approximately $80.00. Only 175 copies were issued and of these all but thirty have been distributed to persons carefully selected. It seemed to the Council to be good business to expend this amount in an effort to retain as many of these trained scientists in Canada as may be possible, especially since the Federal Government has invested a substantial sum in the post-graduate training of each person listed.

Possibly, however, if you consider it wise, it would be sufficient in times such as the present when comparatively few appointments are being made, to distribute this document at intervals of two years instead of annually.

MEMORANDUM OF A CONVERSATION BETWEEN THE HON. MR. STEVENS AND H. M. TORY, 6 MARCH 1933

. . . 4. I discussed with the Minister the question of space in the new building for the Seed Division of the Department of Agriculture. I pointed out to him that the Tariff Board had now come into our building and had taken laboratory space that we were already setting up for other purposes; that in addition, the Radio Commission had now asked for an additional amount of space nearly doubling what they had stated as their original requirement, and that I did not see how it was possible for us to find accommodation in the building even if we desired. Nearly the whole of the building had now been assigned to definite purposes and the only part that could be said to be completely unoccupied was the engineering laboratories for which equipment could not now be purchased. I suggested that the office building previously occupied by the Council might be suitable. The Minister left the matter in my hands to discuss with Dr. Newton and Dr. Barton.

5. I called attention to the fact that the Department of Public Works

laboratories which should be promptly brought into the Research Building would probably not be brought in as the Chief Engineer of the Public Works Department wished to continue to exercise direct control.

6. . . . It was further agreed that the question of representation at international conferences should be subject to our control. . . .

9. I pointed out to the Minister further, that while we had been denied the right to use the capital vote which had been made under the Department of Public Works for the finishing and equipping of our building, the vote was now being used to equip the Health Department Laboratories, the Radio Commission offices, and the Tariff Board offices in our building; that while I was not complaining of that being done, the fact remained that I had, at the request of the Minister, deliberately avoided spending money for the current year, with the understanding that the amount would be re-voted for next year to complete our equipment and that it now appeared as if this were not to be done and that we would be left in an extremely difficult position regarding equipment. It was agreed to have the matter further discussed in connection with the supplementary estimates. . . .

12. I informed the Minister that I had been called upon by a representative of the shingle manufacturers of British Columbia, who asked us to undertake the standardization of shingles. . . . He agreed that this should be done. . . .

14. I informed the Minister that I had been called upon by Colonel Girard who had been seeking employment for his son who was a graduate of the Hull Technical School, and that he had suggested that his son work in the laboratories without payment in order to advance his knowledge and keep him employed. I suggested to the Minister that it might be possible for us to secure a good deal of valuable assistance from young engineers and other young men similarly trained under the relief scheme now being worked by General McNaughton. The Minister's view, in which I concurred, was that such a matter would have to be handled with great delicacy. He suggested that I discuss the matter further with General McNaughton with a view to suggesting some plan of action that might be considered.

TO THE HON. H. H. STEVENS FROM H. M. TORY, OTTAWA, 6 APRIL 1933

I. With regard to the purchase of the property now occupied by the National Research Council

In reply to the question as to the cost of the site of the National

Research Council building asked in the House by Dr. McGibbon, the answer to which may lead to discussion, the following is submitted.

a. . . . the whole purchase price may appear large if looked upon only as a piece of land: the total item being $525,000.

b. Apart, however, from the site on which the new building is built, the land included the island section on which the buildings stand which have been repaired and are in use by the Bureau of Statistics, and the main land section on the east side which has a group of buildings, at the present moment only partially occupied. These latter buildings are concrete and brick, built to be fireproof, as mill buildings. Certain of these have been brought into use:

1. The building facing John Street, the interior of which was fitted up, one half for laboratories of the National Research Council and the other half for the Moving Picture Bureau.
2. Another building has been fitted up and made into the permanent workshop for the National Research Council.
3. Another building has been repaired and made an excellent building for the wind tunnel for aeronautical work.
4. Another building has been repaired somewhat and has been made suitable to perform two functions; first, a room for the dynamometer for testing aeroplane engines, thus enabling Canada to carry out her international agreement with regard to testing aeroplane engines; and second, a room for the testing of domestic oil burners.
5. Another building served as a place in which the water channel for testing floats could be erected.
6. Another large building still remains unoccupied, but was intended to be fitted up as an hydraulic research laboratory. Such would have been the case but for the financial position of the country which has since developed. This building is eminently suited for that purpose, as the water from the falls is already carried into the building and it it only a matter of putting in heating and the necessary testing equipment to put it into operation.
7. In addition, there was an office building on the south side of the road, which is now occupied by the Engineering Standards Association. . . . This building is large enough to form a permanent headquarters for the administration of standardization work in Canada, upon which so much importance is being placed today.

c. In addition, a developed water power was acquired with hydro-electrical equipment capable of meeting the requirements of the John Street Annex of the Council's Laboratories.

It is suggested that but for the fact that these buildings were already

on the grounds, some of them so suitable for the purposes to which they were put that new buildings could not have improved the situation, the cost of establishing these services would have been almost prohibitive; it would have cost at least as much as was paid for the whole property in order to get new buildings to house the services that are now in operation.

II. With regard to the questions asked respecting the travelling expenses of the President of the Council

In this regard, the explanations attached to the answers should be sufficient; namely, that for nearly two years and a half the President of the Council was serving in an honorary capacity and hence it was necessary for him to travel frequently from Edmonton to Ottawa in order to overtake the necessary work.

With regard to the special expenses for 1928–29, it will be recalled that it was agreed between the Chairman of the Privy Council Committee (Mr. Malcolm) and the President, that before the new laboratories were built, a thorough inquiry into the laboratory systems of the Countries more highly developed along scientific lines should be made. To do this it was either necessary for the President to make the investigation or to have some other competent person appointed so to do. It was regarded as not only more economical but wiser that this work should be undertaken by the President himself. The information that was gathered in England, France, Germany, and previously in the United States, was made available to the architects planning the laboratory system and has resulted in the development of thoroughly modern laboratories for Canada. It is respectfully suggested that this information was obtained at probably one-fifth of the cost that would have been necessary had a special person been employed to make the investigation.

With regard to the years 1929–30, the Government authorized the National Research Council to undertake the investigation of the smoke damage which it was alleged was being done in the State of Washington by the Trail Smelters situated in British Columbia. The authorization was given by the Committee of the Privy Council at the request both of the Department of External Affairs and the International Joint Commission. This necessitated two special trips to British Columbia and Washington for the purpose of determining what work should be done and for securing personnel to carry it out; and later, after the evidence had been collected and correlated, the President and certain scientific representatives of the Council had to attend the hearing in Washington lasting over two weeks.

TO H. H. STEVENS FROM H. M. TORY, OTTAWA, 11 MAY 1933

. . . Type of Staff

Then the whole question of the type of staff that would be organized in the Council had to be considered, and very careful thought was given to it by the Research Council, myself and the Chairman of the Privy Council Committee at that time. Two schemes for the direction of the Laboratories presented themselves.

1 By means of a General Director under the direction of the Council. This method is followed in some of the large commercial laboratories, such as the Eastman Kodak Laboratories in Rochester. The name of a distinguished American industrial scientist was mentioned in this connection.

2 I personally held the view that such a highly trained specialist in one branch of science was not what we required. The head of a laboratory, such as that of the Eastman Kodak Company, was without question a distinguished chemist, but we would not be dealing with problems related to one particular type of industry only, and the divisions of our laboratories would have to be on a much more general basis. What we required was a small group of men, each a specialist. Therefore provision should be made for directors in physics, chemistry and biology, the appointees being men whose training was of such an order that all the work being done under these divisions could be under their direct personal supervision. After mature consideration the Council unanimously agreed with this view, and I was instructed to make my plans along those lines. . . .

The scheme of appointments and salaries drawn up is now of little moment, as all the vacancies unfilled a few months ago were cancelled by Order-in-Council, but I think I am justified in referring to it for a moment. If you look at it and compare what was approved with the staff as it at present exists, you will see that, apart from appointing Directors of the type mentioned above, and for special reasons in connection with Aeronautics, one Assistant Director, I immediately began to fill, not the senior, but the junior posts. I did this intentionally, because I knew from experience that the building up of a competent research staff would not be easy, and that it would be better as far as possible to develop under competent directors younger and more recently trained men, who as they proved themselves would be promoted to the higher posts, or if they failed to come up to the standard we required could be easily let out of our organization. This accounts for the fact that on the average our salary schedule, as it stands today, is low. Even including the salaries

of the Directors, our average for men holding the doctor's degree is $1,000 less than the corresponding average under the Department of Mines. . . .

Qualifications of Directors

In order that you may judge how far the men selected as directors meet the conditions suggested above, I beg to submit the following:

The head of our Division of Physics and Engineering is *Robert W. Boyle*, B.Sc., M.A., M.Sc., Ph.D., F.R.S.C. Dr. Boyle was appointed after a complete survey had been made of possible appointees in Canada. Only two men in my judgment at the time had the scientific maturity and practical outlook necessary for the appointment. One of these, Professor McLennan, was not available, as he would not have accepted any appointment other than the position which I myself held. There were one or two others who had passed the age limit at which it seemed to me advisable to bring them into the organization. Dr. Boyle was the unanimous choice of the Council.

Dr. Boyle graduated from McGill in Electrical Engineering in 1905 as the gold medalist of his year. He continued as a post-graduate student in Physics and in 1906 he received his M.Sc. degree and was appointed Lecturer in Mathematics and Physics. He was awarded his Ph.D. degree in 1909. The same year he was awarded the 1851 Science Research Scholarship and spent three years in study at Manchester and Cambridge and in Germany. During his scholastic career in the Old Country he maintained the high standard that characterized his work in Canada. He returned to McGill and was appointed Assistant Professor in 1912. Later in that year he was appointed Professor of Physics at the University of Alberta, and began a very distinguished career of service as a teacher and researcher.

In 1916 in connection with the War, as you know, there was an urgent call for the assistance of scientific men. Those who knew Dr. Boyle in England immediately requisitioned his services. He went to England and spent three full years in research work under the Admiralty Board of Inventions and Research and later in the Anti-Submarine Division. The work he accomplished was in connection with submarine detection under the secret name of Asdics. Out of the work carried on by Dr. Boyle in co-operation with French experimenters grew the new science of ultrasonics, which has since been applied by the British Admiralty in all naval ships and has also been widely applied in the mercantile marine. It may interest you to know that the first ultrasonic device used in Canada is now being installed in the Canadian Government hydrographic ship.

In addition, Dr. Boyle acted as confidential agent of the Admiralty on scientific missions on seven or eight occasions in connection with submarine detection; on these missions his duties consisted of consultations with scientists and naval officers and executives of the allied nations.

Under the general subjects of Properties of Matter, Electricity, Radioactivity and Ultrasonics—in the fields of both Physics and Engineering —Dr. Boyle has published over forty scientific papers embodying the results of his researches, and he has also published other articles on scientific and educational topics of a more popular kind. In addition to published papers, he has written many scientific and engineering reports covering the scientific work done during the war and the engineering equipment of ships with the practical appliances for ultrasonic underwater signalling and submarine detection. Many of these reports would ordinarily have been published in scientific and engineering journals, but since they were all of a confidential nature and therefore came under the Official Secrets Act, they were not permitted publication.

In 1919, Dr. Boyle resumed his professorship at the University of Alberta, and when in 1921 it became necessary to organize a Faculty of Applied Science, he was the unanimous choice of the scientific group at the University for the headship of the Faculty. During all that period he was a member of the Alberta Research Council.

These facts, I am sure, will convince you that Dr. Boyle is not an ordinary college professor, but a man of outstanding scientific attainments. It is not unusual, even in Canada, for Deans of Faculties to receive from $7,000 to $8,000 a year. Dr. Boyle has to my personal knowledge refused to consider an appointment in England at a salary equal to what he was offered by us, and has also refused to allow himself to be considered for a university presidency in Canada, preferring to continue to guide and direct research to the acceptance of a post involving administration.

With regard to *Dr. Robert Newton*, Director of the Division of Biology and Agriculture, I need hardly go into detail as you are already familiar with his career. He is a Bachelor of Agriculture of McGill University. After graduation he served for three years in the Canadian forces overseas. At the end of his war service, under the arrangement made with the Educational Services of the Canadian Expeditionary Forces, of which I was Director, Dr. Newton was placed in Cambridge University and studied under Sir R. H. Biffen. Returning to this continent he proceeded to Minnesota University, where he took his doctor's degree after a very distinguished scholastic career, and he has since been elected a Fellow of the Royal Society of Canada.

Dr. Newton took his post-graduate training in plant biochemistry, and he is without question the outstanding plant biochemist in Canada and one of the three or four outstanding men on the North American continent. When I was looking for a plant biochemist for the University of Alberta, Dr. Gortner, head of the Department of Plant Biochemistry at the University of Minnesota, told me that Newton's scholastic career at the University of Minnesota had never been surpassed. In addition to specializing in Plant Biochemistry, Dr. Newton's training covered the broad field of general biological studies.

He has spent 13 years in university work, during eight of which he was head of a Department of Field Crops. When we undertook the organization of the rust researches and those on plant diseases in western Canada, Dr. Newton came automatically into a position of leadership. He has been the directing force in our Grain Research Committee since its inception. He had not only a tremendous capacity for work himself, but a genuine gift for securing the co-operation and good-will of other men. I have heard many comments about Newton, but have never heard anyone express any opinion other than that he was the natural leader of research in Agricultural Biology in Canada. He has already published 29 papers, and by his researches has opened the door to new points of view in Plant Biochemistry. He undertook the most difficult of all the tasks connected with the rust research—that of studying the causes of immunity from rust in some of the lower forms of rustless wheat, with a view to giving direction to the plant breeders regarding the qualities to be sought for in possible rustless strains of bread wheats.

Dr. Newton, to my personal knowledge, has refused the principalship of a college in the United States. He also refused to allow his name to be submitted for the presidency of a university in Canada, as well as the principalship of Macdonald College. As you probably know, when Dr. Robertson left Macdonald College, the headship of the College was reduced from a principalship to a deanship. On Dean Barton's accepting the position of Deputy Minister of Agriculture at Ottawa, Sir Arthur Currie offered Dr. Newton the most flattering terms of appointment including the restoration of the principalship to its previous standing under Dr. Robertson. These appointments he refused because of his profound interest in research.

Dr. G. S. Whitby, Director of the Division of Chemistry, is a Bachelor of Science of the University of London, an A.R.C.Sc., and M.Sc. and Ph.D. of McGill, an LL.D. of Mount Allison, and a Fellow of the Royal Society of Canada. He is a Fellow of The Institution of the Rubber Industry of Great Britain, a Fellow of the Canadian Institute of Chemistry, a Member of Sigma Xi, and an Officer d'Académie (France).

After graduation in 1906 Dr. Whitby was a Demonstrator in the Imperial College of Science and Technology, London. He was then Chief Chemist, Société Financière des Caoutchoucs, and later Professor of Organic Chemistry, McGill University. During the whole of the 27 years since he graduated he has been engaged in research, chiefly in connection with the rubber industry and associated fields of organic chemistry. For seven years he was the chief chemist for a group of rubber companies in the East Indies. He has had the distinction of receiving the Frank Hatton prize for chemistry from the Royal College of Science, London, and the Governor General's Medal for Research from McGill University. Two years ago he was given the Colwyn Gold Medal by the Institution of the Rubber Industry of Great Britain. He has been active in the organization of the chemical profession in Canada, and has been President of both the Canadian Institute of Chemistry and the Canadian Chemical Association.

He has acted as consultant to a number of the largest industries in the country. He has published one book and 70 scientific papers, and holds 18 patents in his own right.

Dr. Whitby is a man who at any time could find a large place for himself in the industrial world, if it were not that he prefers to follow research as a career. He had a large and growing consulting practice with the industries not only in Canada, but also in the United States, and at the time he accepted appointment with the Research Council his income from that source was nearly equal to that received from the university where he was a professor. He came to us at a salary of $1,500 less than he was earning at the time because he preferred to devote his whole time to the direction of research. . . .

MEMORANDUM OF A CONVERSATION BETWEEN THE HON. H. H. STEVENS AND H. M. TORY, 12 MAY 1933

. . . 7. With regard to employing persons in the laboratories without pay, the Minister agreed that this would be a wise thing to do under certain conditions:

A. That the men so working would be in a position to benefit personally by the experience in the laboratories, the idea being to give help to studious-minded young men;

B. They should submit to the regular discipline of the laboratories as to hours and days of work, etc.;

C. It would be made clear at the beginning that such experience would not give them any claim for appointments in the future. . . .

MEMORANDUM OF A CONVERSATION BETWEEN THE HON. MR. STEVENS AND R. W. BOYLE, 31 MAY 1933

. . . 2. Informed the Minister of the progress thus far in giving information to General McNaughton re the unemployment relief scheme which would attach both professional and sub-professional personnel to the National Research laboratories. On taking a survey of the requirements of the Laboratories as regards personnel we found that we could, profitably to ourselves and to the personnel, usefully employ on full time without expenditure of extra money for equipment, seventy-five men of the professional class and twenty-five of the sub-professional. These figures were accepted by General McNaughton as a basis for his computations. . . .

3. Reported to the Minister that under the scheme to which he gave his consent two weeks ago, whereby extra personnel could be engaged for laboratory work, under the laboratory regime of attendance and discipline but without salary, thus far six men had been engaged, two in the Division of Biology, three in the Division of Chemistry; and one in the Division of Physics and Engineering. . . .

TO H. H. STEVENS FROM H. M. TORY, OTTAWA, 12 JULY 1933

You will recall that the Justice Department has given a ruling to the effect that the Order-in-Council designating the staff of the National Research Council part of the Civil Service for the purpose of the Civil Service Superannuation Act applies to the scientific staff of the National Research Laboratories as well as the administrative staff of the Council.

Although this decision was made by the Governor in Council, the Justice Department has ruled that it can now be changed only by Parliament. The Department has, however, pointed out that employees can be rendered ineligible to be contributors under the Superannuation Act by giving them appointments for a fixed term instead of indeterminate.

After long consideration of all phases of this question, the conclusion has been reached that all of the present members of the staff of the Council should be left under the Civil Service Superannuation Act with the exception of a very few persons whom it is not yet clear should be brought under that Act, either because of the temporary nature of the work on which they are engaged or because they have not yet proved beyond doubt their suitability for permanent appointment. . . .

TO H. H. STEVENS FROM H. M. TORY, OTTAWA, 6 NOV. 1933

As you requested, I am sending you a series of letters that we have received from time to time, commending the work of the Council. There are so many of them that it was hard to make a selection, but I think perhaps if you glance through the first half of this bundle you will get the general drift of what the people who are appealing to us are saying about our work. I hope you will find these of some service.

TO H. H. STEVENS FROM H. M. TORY, OTTAWA, 1 FEB. 1934

. . . We had approximately 150 applications for the position. A committee of the Council reviews all applications. . . . It was remarked by all that the list was extensive and that there were many strong men in the field; it was considered surprising and deplorable that men of advanced educational attainment were obliged to make application for Junior Research positions, carrying low salaries. This fact indicates the difficulties of the present times. . . .

To those persons who have applied for posts with us and have not received appointments, we have never given reasons for non-appointment. We have always placed it on the basis that another man was selected because we believed in his superior suitability. . . .

TO H. H. STEVENS FROM H. M. TORY, OTTAWA, 7 MARCH 1934

I have just been informed of Mr. Grant's inquiry yesterday afternoon regarding the employment of a stenographer for a period of one month to meet an emergency in my own office. . . .

I realize, however, as a result of Mr. Grant's inquiry that it would be advisable in order to prevent any possibility of misunderstanding, that in future if it should be necessary to make an emergency appointment without first consulting you, and I think this is the first occasion on which this has been necessary, I should immediately advise you by letter of the action taken and the necessity therefor. I will see that this is done in future so that you may always have full knowledge of every appointment to our staff. . . .

TO H. M. TORY FROM J. H. PARKIN, OTTAWA, 19 JUNE 1934

Re Additional Staff in the Oil Burner Testing Laboratory: Sub-professional assistant at $60 per month. It is recommended that Mr. ——

be appointed, if possible, the appointment to be dated 1st June, 1934. The reasons for the recommendation are as follows:—

(a) Mr. —— has worked in the laboratory under the no-remuneration plan since June 12, 1933 and has done satisfactory work.
(b) The experience gained in the laboratory routine during his year's work renders him particularly useful and valuable in the laboratory.
(c) He has demonstrated his interest in the work, keenness and perseverance by working for the year without pay.
(d) He is a graduate of the Hull Technical School and had done some work on heating appliances before coming to the laboratory. . . .

TO E. C. INNES FROM T. H. DOHERTY, OTTAWA, 21 AUG. 1934

We are in receipt of your wire of Aug. 18. The selection committee has authorized your appointment to the Oil Burner Laboratory under the auspices of the Associate Committee of Fire Hazard Testing, at a salary of $100 per month.

As stated in our previous letter, it is impossible to predict how long the work in this Laboratory will continue and the appointment is therefore of a temporary nature subject to termination upon reasonable notice. Very few appointments have been made by the Council within the last two years and it is therefore requested that you refrain from advertising the fact in trade journals, newspapers, etc. . . .

TO W. H. GRANT* FROM S. P. EAGLESON, OTTAWA, 23 FEB. 1934

I have this morning received your private letter requesting for the information of the Minister a list of the motor cars in the service of the Research Council. . . .

When the present administration came into office, the use of departmental cars was greatly restricted and this car was recalled but on further consideration it was restored to the Council. . . .

The present trade-in value of this car is approximately $200.00. . . .

TO THE HON. R. B. HANSON FROM H. M. TORY, OTTAWA, 14 DEC. 1934

National Research Council
Explanation of Request for Increased Vote

. . . The members of the National Research Council consider that if

*Private Secretary, Department of Trade and Commerce.

the Council was an ordinary spending department of Government there might be justification for still deferring action with respect to an increased appropriation, but since the work of the Council is largely to prepare the way for industrial development two, three, or more years, hence, it is extremely important, in order that the Council may render effective aid in industrial recovery during the next few years, that this should be one of the first votes in which an increase is authorized. . . .

National Research Council Estimates, 1935–36

. . . Attention is called to the fact that the National Research Council has suffered, perhaps more severely than any other part of the public service, through the reductions which it was necessary to make in its parliamentary appropriations, just at the time when the National Research Laboratories had been established and the Council had been committed to an increased obligation in providing for the salaries of the staff of the new laboratories. The following table indicates clearly the reduction which has been made in the appropriation of the Council for all purposes other than salaries:

Year	*Vote*	*Salaries*	*All Other Activities*
1929–30	$400,000	$ 83,000	$317,000
1930–31	500,000	185,000	315,000
1931–32	478,000	260,000	218,000
1932–33	410,000	269,000	141,000
1933-34	379,500	270,000	109,500
1934–35	379,500	269,750	109,750

The effect of a continued decreased appropriation, notwithstanding a very greatly increased expenditure obligation, has been cumulative. By the end of the present year the financial resources of practically all of the committees co-operating on large projects under the Council will have been exhausted. It is, consequently, impossible for the Council to continue even existing work or to operate efficiently without an increased appropriation. . . .

TO THE HON. R. B. HANSON FROM H. M. TORY, OTTAWA, 19 DEC. 1934

Re: Current Account

In connection with the increase requested in the current vote for the National Research Council, I beg to submit the following facts for consideration by yourself and the Treasury Board:

I. *Increase in the vote for operation of laboratory divisions*

(a) For the past two years money available for up-keep of equipment has been on a very small scale. This created difficulties for the Council due to the fact that the original expenditure for equipment had been largely cancelled, and our work was being carried on, to a considerable extent, on an improvised basis.

(b) During the year we were forced to undertake certain big projects which necessitated special expenditures which could not be foreseen, of which the following are selected from a large list merely as illustrations:

1. The study of cold storage and refrigeration problems had to be pursued in three directions . . . the possibility of regulated temperatures for the transport of perishable products over railways . . . the causes of the heavy losses due to spoilage of celery in the warehouses in Montreal . . . a co-operative study of the factors affecting the storage of poultry. Each of these items added unexpected expenditures.
2. At the request of the Government, we had to undertake the study of the standardization of gasoline. . . .
3. We also had to set up a Government Purchasing Specifications Committee. . . .
4. At the request of Government Departments we established a Survey Research Committee for the purpose of co-ordinating . . . survey work. . . .
5. At the earnest request of the companies manufacturing insulating material for acoustical testing, we have had to set up an acoustical testing laboratory. . . .
6. . . . A more or less complete new equipment in connection with standards of weights and measures will have to be purchased. . . .
7. The year before last, there was turned over to us the Metrology Laboratory of the Department of the Interior which carried with it an obligation of $17,000 on our part, apart from the necessary purchase of equipment from year to year. For the past two years no extra provision was made for us for carrying out this work and it has had to come out of our ordinary much reduced vote.
8. During the year, at the request of the Department of Trade and Commerce, we have had a very intensive investigation of electrical moisture testers in connection with the sale of wheat. . . .

9. Our Grain Research Committee has had to undertake, at the request of the Wheat Pools and the National Barley Committee, extensive research in connection with the production of barley in Western Canada. . . .
10. During the year we have had pressed upon us the necessity for a study of the possibility of using non-metallic mineral products in Canada as against imported material now very largely used. . . .
11. We imported in 1929, $3,789,423 worth of sulphur, the largest item of chemical import, yet our smelters and mines are turning out daily as waste products thousands of tons of material which represent potential sources of sulphur. It has been urged upon us to undertake this work and a very slight amount of preliminary experimentation indicates a successful outcome. If staff and equipment are made available we propose pressing this item during the coming year.
12. Many problems have been pressed upon us relating to the leather business but because of lack of equipment and adequate staff we have only been able to make a beginning. . . .
13. . . . An overwhelming proportion of the raw wool used in Canada is imported. To develop sheep-growing in Canada, an important desideratum is a "dual purpose" sheep suited to range conditions in Western Canada, i.e. a sheep combining good qualities for both wool and mutton. . . . It is essential that more money shall be devoted to the project than the Council's very restricted present funds permit. . . .
14. It is desirable that our work in connection with waste natural gas should be extended. Even after the enforcement of conservation measures recommended by the Alberta Gas Conservation Commission, the waste of natural gas in the Turner Valley is more than 200,000,000 cubic feet (say, 4,000 tons) a day. . . .
15. The discovery of radium in Canada and the necessity for standardization of the uses of radium as well as the standardization of X-ray dosage made the setting up of an X-ray and radium laboratory an absolute necessity. . . . About 550 tubes of radium have already been checked and standardized for the companies and organizations selling or using radium.
16. Recently the whole question of substituting potatoes for corn now being imported in the manufacture of millions of pounds of a variety of food products has been submitted for study. . . .

During the year the number of written requests for assistance has more

than doubled over that of any preceding year. Over 500 such requests for help have come to us during the past three months. We have dealt with these as best we could by means of reports and documentary assistance but it was impossible, except in a very few cases, to undertake new laboratory work in connection with them.

Publications

II. . . . A similar increase of demand upon us for information has necessitated the asking for an increased expenditure on this item. Last year we reduced the item as part of the special cut of $25,000, but in the end we had to find $5,000 extra from other sources to meet this demand. This meant that other demands almost equally important had to be postponed.

III. . . . Our grant for scholarships was reduced from $60,000 in 1930 to $12,000 last year and our grants in aid of research had to be reduced on a much greater scale. The Council earnestly hopes that it may be permitted to regain some of the lost ground in this connection as it considers no work being done of greater importance. . . . I have on my desk a list of over 100 problems, a number of which have in their solution great commercial possibilities, none of which can be undertaken at present.

TO O. S. ASMODT (UNIVERSITY OF ALBERTA) FROM R. NEWTON, OTTAWA, 8 MARCH 1934

. . . Personally, I do not wish to be concerned in any further controversy about Garnet wheat. When requested, as in this case, we supply the Minister of Trade and Commerce and the Board of Grain Commissioners with any information we have available or can obtain, and it then becomes their responsibility to take such action as they deem appropriate. However, because of the influential position you occupy on the Alberta Zonation Committee, I thought you should be informed that the situation in regard to Garnet wheat seems to be becoming more and more serious, and bids fair to smash what is left of our export trade unless something is done about it. I have not seen a single good report on Garnet wheat from any European milling chemist in recent years. I think Mr. Newman realizes the position as keenly as anyone, but he feels that the advent of new varieties, especially of higher yielding selections of Reward, will gradually push Garnet out of the picture. It is his opinion that it is already on the wane, except in certain districts in Alberta and Northern Saskatchewan. I hope he is right, but at the same time I feel

the Alberta Zonation Committee is taking a very serious responsibility in continuing this variety on their recommended list. . . .

TO H. H. STEVENS FROM H. M. TORY, OTTAWA, 13 MARCH 1934

There are two matters in connection with the present situation of agriculture in Canada to which I have lately been forced to give some intensive study, and I feel it is necessary that in all good conscience I should let you know something of my thought regarding them.

I. The first is in connection with the Garnet wheat situation. . . .

On February 16, 1931, I forwarded to Dr. Manion, Acting Minister of Trade and Commerce at the time, a report of the findings of our Associate Committee on Grain Research on this matter. The document was submitted to the Minister of Agriculture. . . .

Exactly what we predicted would happen has happened. It could not be otherwise, for our findings were on the basis of the most intensive scientific study of the question. So far as I am aware, no effort was made by the Department of Agriculture to prevent an increase in the growth of Garnet and as a result today we have approximately 60,000,000 bushels of Garnet, mostly No. 2, so mixed with Marquis as to affect the value of the whole wheat crop of western Canada. . . . we have risked the reputation of our Canadian wheat as a mixing wheat with the lower grade varieties, the foundation upon which the price differential in our favor has always rested.

II. The other matter to which I wished to call your attention is one in connection with further grain researches. It appears clear that for some years at least we are to be faced definitely with the problem of organized limitation in wheat production. Such being the case, it would seem sensible to encourage the growth of wheat in the areas where we know we can produce high quality grades and to seek to substitute other types of farming in those sections of the country where wheat of a less desirable quality only can be produced. If this were done, we could probably ensure a market for an indefinite time for high grade wheats for blending which could be produced in suitable areas, a complete knowledge of which is now available as a result of our researches.

It would appear equally sensible that we should give intensive study to the types of agriculture to be substituted in the other areas. . . . In the drying process considerable quantities of wheat were injured. . . . As the result of this, the Research Council undertook a scientific study of the whole subject, and I am happy to say that in the course of two or three years were able to give such complete information on methods

of drying that the necessity for future losses was entirely eliminated. It has been said to me repeatedly by those competent to judge that this research alone has already repaid to Canada the cost of the National Research Council to date. . . .

I am therefore most emphatically of the opinion that we should now be authorized to undertake an exhaustive study of the whole problem of the production of the coarser grains with regard to varieties suitable for the various uses to which they would be put and the location of areas in which these varieties could best be grown. This would be a long-term investigation and would be undertaken with the idea of obtaining such complete knowledge of the possibilities as to make it of value for the development of a permanent agricultural policy. . . .

TO H. M. TORY FROM R. B. HANSON, OTTAWA, 29 MAY 1935

With regard to the question of your re-appointment as President of the National Research Council and your letter of May 7th on this subject I, personally, regret indeed to have to inform you that Council has decided that on the expiration of your term of office—namely, June 1st, 1935,—you will not be re-appointed, but that a successor will be named in due course.

I put your case up to Council fully and fairly and asked for the two years' extension desired, but Council decided that, notwithstanding the fact that you are not under the Civil Service Commission, the Civil Service Act, or the Superannuation Act, they would carry out the policy of not extending the appointments of officers of the government service who had reached the age of 70 years.

You are aware that, under the Civil Service Superannuation Act, no contributor shall be retained in the Civil Service beyond the age of 65 years and the only provision for extending that service is the authority of Council, which may extend annually such service beyond the age of 65 years for a period not exceeding five years, with the approval of Council for each year's extension.

As you know, the term of your office as President of the National Research Council expires under authority of Order in Council P.C. 597, dated April 18th, 1928, which covered a period of seven years, and until your successor has been appointed; and by reason of your being over 70 years of age, Council did not feel justified in extending your services beyond the date mentioned.

I want to take this opportunity of thanking you for your kind co-

operation and assistance since I have taken over the duties of Minister of the Department under which you serve and I want to say, further, that the Government appreciates to the full extent the service you have rendered, not only to the Government itself but to Canada as President and Chief Executive Officer of the Council in your supervision and direction of the work of the Council and of the officers, technical and otherwise, appointed for the purpose of carrying on and promoting the utilization of the natural resources of Canada, and the work of improving the technical branches and methods used in industrial research with a view to utilizing waste products, etc.

I hope on your retirement that you will continue to enjoy good health with the same vigor of mind and body which you have maintained to the present time.

With every good wish for the future. . . .

TO R. B. HANSON FROM H. M. TORY, OTTAWA, 30 MAY 1935

I have your letter of May 29.

From its contents I am not sure whether you desire me to continue after the first of June until my successor is named. Under my agreement I would so continue. There is a great deal to be done in rounding out the work of the past year. I would be grateful for immediate instruction as to whether I am to leave the office on the first of June.

TO H. M. TORY FROM R. B. HANSON, OTTAWA, 31 MAY 1935

Further to my letter of May 29th, and in reply to yours of the 30th in regard to the question of your retirement, please be advised that the decision of Council is that the term of your services as President of the National Research Council expires as from May 31st, 1935.

RELATIONS WITH GOVERNMENT DEPARTMENTS

TO H. M. TORY FROM R. NEWTON, OTTAWA, 12 APRIL 1932

Co-ordination is the outstanding requirement of the government services in biology and agriculture. At present the tendency is for every institution to extend its field of activity as widely as possible, rather

than to work intensively in a restricted field. This is nowhere seen more clearly than in the Experimental Farms. The Branch Farms can serve a very useful purpose as demonstration stations and as places where the local applicability of principles discovered at a central research institution may be tested. In practice they have gone far beyond this, each one of them attempting to build up a comprehensive "research" organization with a multiplicity of projects covering all parts of the field. Obviously it is impossible to carry on such programmes effectively with their limited staffs, most of whom are not in fact trained for research. The real service they might render is in part nullified by scattering of effort and dissipation of resources.

Regional problems, such as wheat rust, may sometimes arise which are of sufficient importance to justify intensive local research. Such a case is not, however, to be met by placing one or two men in a small, inadequately equipped laboratory in an isolated location. Men of the proper research calibre would not be satisfied to work long periods out of contact with fellow scientists, libraries, and the other facilities of a large institution. The problem was met very successfully by placing the Rust Laboratory at the University of Manitoba, and other laboratories at other universities.

The primary need in the government laboratory and research services is a clear definition of the field and function of the different branches and laboratories. Such a definition could only be made after a complete survey of the services by some competent body charged with the necessary special authority.

The second need is the provision of machinery for continuous co-ordination by some body such as the National Research Council. The Council has already accomplished considerable along this line by voluntary action, but human nature sets a limit to what can be done unless the co-ordinating body is given specific authority. . . .

It should be noted that the National Research Laboratories possess no land or barns for experimental work with crops or stock. They should logically look to the Experimental Farms for co-operation, when it becomes necessary to make practical tests of principles in plant growth or animal nutrition which have been discovered in the laboratories. This might require contacts with the Divisions of Animal Husbandry, Field Husbandry, Horticulture, Cereals, Forage Plants and Fibre plants.

In regard to the Seed Branch, it may be pointed out that the Analytical Division has occasionally carried on investigational work, and for some kinds of investigations it has particularly good opportunity, because of

the volume of seed samples which passes through its laboratories. Without anticipating the conclusion which may be reached as a result of the complete survey recommended, it may perhaps be suggested that a Branch whose primary function is to administer an act (in this case the Seed and Feed Acts) should for the most part restrict itself to research the object of which is to promote the effective administration of the Act. At least, research going beyond this scope should be co-ordinated with that done by other governmental research agencies.

Again, it may be suggested in regard even to government laboratories not doing research, but devoted chiefly to routine analyses for the purpose of administration or control work, that they would surely benefit from a measure of technical oversight which would ensure their methods and the kind and quality of their work being brought periodically under review by a competent body.

In conclusion, I should like to emphasize again the two main points:

(1) The biological and agricultural services should first be carefully surveyed by a competent person or body charged both to define the proper scope of the various branches and to indicate what consolidation of laboratories or services is desirable.

(2) Some body—and I feel the logical one is the National Research Council (as distinct from the National Research Laboratories, the officers of which should be kept free to devote themselves to their own researches)—should be charged with the continuous responsibility both for the technical oversight and the co-ordination of all government laboratories. I feel that the Research Council should appoint an officer of senior rank to devote his full time to these activities.

TO J. G. PARMELEE* FROM H. M. TORY, OTTAWA, 16 APRIL 1932

I enclose herewith a memorandum on the laboratory situation, as requested by you. I have not signed it, as I thought you would put it in your own name. I have, of course, no objection to the Minister knowing that I drafted it.

MEMORANDUM REGARDING LABORATORIES

It is rather difficult to get a reasonable estimate of what laboratories might be advantageously brought under a common system without having had the privilege of going over the laboratories in detail, determining

*Deputy Minister, Department of Trade and Commerce.

exactly the kind of work being undertaken in them and the amount of time that is devoted to administrative work outside of such efforts at research as are being made.

Types of Laboratories under the Federal Government

Laboratories under the Federal Government may be divided broadly into two classes—

(A) Laboratories the work of which involves a greater or less amount of research or which could to advantage be developed definitely along research lines.

(B) Laboratories the work of which is concerned primarily with the administration of Acts of Parliament or with testing of a somewhat routine character.

(A) *Laboratories the work of which involves research*

Of the laboratories of the first sort, the main laboratories outside of agriculture are the laboratories in the Mines Branch, the Forestry Branch and the Dominion Observatories in Ottawa and Victoria.

(1) The Geological Survey may be considered as being concerned with the *location* of mineral resources in Canada, and stands pretty much in a position by itself, except in the use of geophysical methods of prospecting, which is in the strictest sense a problem for physicists to solve, as is shown by the fact that the Geological Survey has been using professors of McGill and Toronto in assisting them in a solution of this problem.

(2) The Mines Branch laboratories may be regarded as concerned with the *character* of the mineral resources located by the Geological Survey. Here is a distinctive branch of service which, properly co-ordinated, would be working in the closest liaison with the central research organization. This liaison has been effected in the United States and in Great Britain, where complete coordination of effort has been brought about.

(3) Under the Mines Branch the Divisions of Ore Dressing and Metallurgy, Fuels, etc. may be regarded broadly as being concerned with the *utilization* of mineral resources, the Ore Dressing and Metallurgical Division being concerned more particularly with the winning of metals from the ores. Here again, especially in relation to the analytical work involved, a close relation and coordination should be brought about in relation to the National Research Laboratories, especially in the planning of programs and in interchange of information.

In none of these three instances is it intended to suggest that the personnel should necessarily be under the control of the Research Council, but coordination of work to avoid duplication ought to be brought about.

(4) With regard to the Forest Products Laboratories, they could be brought into intimate relationship, preferably, as in England, under the control of the National Research Council. A considerable part of the work of these laboratories is of a chemical nature, for example, wood preservation, fireproofing, gluing, wood utilization; part of the work bears on physics and engineering, for example, timber testing, strength of materials, etc.; some of it is biological in character, for example, wood preservation, timber pathology, etc.

The National Research Laboratories now have a Chemical Division specially fitted to undertake all types of chemical work. Its plans could easily be extended to include varnishes, paints, wood distillation, and the study of wood by-products generally. The Division of Physics and Engineering will be fully equipped for testing all sorts of building material, including strength of materials, machines capable of caring for work now being sent to the United States because of lack of facilities in Canada. The work of this division could easily be adjusted to care for all the physics and engineering work of the Forest Products Laboratories. A similar adjustment could take place with regard to biological problems.

The work of the pulp and paper division is almost entirely research. This laboratory is at Montreal, and could with great advantage be related to the work of the Research Council. The Council is already interested in the use of waste pulping liquor for the manufacture of tanning extracts, and its work on straw has a direct relation to the problem of making paper and board from agricultural wastes. The tying of these interests together under common programs would greatly increase the efficiency of the staffs already at work.

(5) The Public Works Laboratories without question would find their natural home in the National Research building, where essential equipment for doing all the work they are now doing must be set up to meet the growing demands that are being made for testing and standardization. Such work would ultimately be done under a testing division of the National Research Laboratories. A good deal of work of this nature is already being done under the Division of Physics and Engineering.

(6) In the Department of Trade and Commerce the Electrical Inspection Laboratories under Mr. Stiver are being brought into the new laboratories of the National Research Council. The standardizing work for this

branch will be done by the National Research Council, as authorized under the new Electricity Inspection Act. The liaison here has been completely established and the plan of cooperation worked out.

(7) Similar arrangements could be made in connection with the Weights and Measures Branch. Here there is a clear distinction between the standardizing work, for which the Research Council is responsible under the Research Council Act, and the administrative work which is done by officers operating under Mr. Way.

(8) So far as research work under the Department of National Defence is concerned, complete coordination has already taken place, and all the work that could be considered as of a research character is now being turned over to the National Research Laboratories. It can be stated without fear of contradiction that not only is more work being done of a real research character than was possible under the arrangement of a small laboratory directed by the National Defence authorities, but the work is of higher quality.

(9) The Physical Testing Laboratories heretofore conducted by the Department of the Interior were transferred last year to the National Research Council, and the work has already been completely absorbed into the Council's organization. The old laboratories on Cliff Street are being abandoned, and the equipment is being set up in the new National Research Laboratories, where the Division of Physics will give supervision and control.

(10) With regard to the Biological Laboratories, complete liaison between the Biological Board and the National Research Council has never been established. Most of the researches undertaken by the Biological Division under the Research Council have been of an agricultural character. The Council has, however, undertaken the solution of a number of problems of a marine character on request of interested parties. Pending the completion of the Council's laboratories, the work has been done through a department of a university either (a) by subsidizing the research in the university laboratory; or (b) by providing a scholarship for a graduate student to work under the direction of a university. The work done in curing the disease causing the discoloration of canned lobsters is an example.

It has been suggested in the past that the National Research Council and the Biological Board should have some common membership, for example, that the Research Council might have representation on the Biological Board and the Biological Board on the Research Council for the purpose of completely coordinating the work of the two organiza-

tions. The real difficulty has been that the National Research Council has been working under a permanent executive, while the Biological Board has been under honorary direction, so far as executive control is concerned. There can be little doubt that a great saving could be effected, or the amount of work done considerably increased if better coordination were brought about.

(11) The Laboratory of Hygiene, and possibly also the Pharmacological Laboratory, of the Department of National Health, would enormously benefit by being in association with the National Research Laboratories where general biological work is being carried on, even if their workers remained under the control of their own department.

(12) It is believed that the scientific work in the Observatories would also be similarly benefited by closer association with the Research Council's activities, as their work is almost wholly research.

B. *Laboratories Engaged in Analytical Work for the Purpose of Administering Acts of Parliament*

Two outstanding examples under this heading are the Food and Drugs Laboratory under the Department of Health and the Laboratory under the Department of Customs. There are also a number of special purpose laboratories in various other departments of Government, especially in the Departments of Agriculture, Marine and Fisheries.

The Food and Drugs Laboratory stands by itself. The advantage it would have by being part of the general laboratory system would be the contact with a group of scientific workers following similar lines of work. The work of this laboratory is mainly routine, administering a special Act.

In the National Research Laboratories it has been found absolutely necessary to have a division of work devoted entirely to testing and chemical analysis. Without question the bringing under the control of one body of all the analytic work done for the Government Services in the various small departmental laboratories would be a tremendous advantage. Under highly trained technical officers much more work could be done by junior men than if left to work in small groups by themselves. . . .

Such a centralization would result in two or three great advantages:

1. It would bring the routine work under the direction and supervision of highly trained specialists. This could not do otherwise than increase enormously the efficiency of the service and the quantity of work turned out per person.

2. It would make available to a central body a mass of information which should be useful for the standardization work of the National Research Council.

3. It would assist in providing information of value in drawing a complete picture from a technical point of view of the industrial and agricultural activities in Canada and would without question suggest openings for research.

4. By bringing this routine and semi-routine work in contact with the research point of view, it would improve its quality and lead to the use, where desirable, of improved testing methods.

In other words, bringing such laboratories in contact with the research and standardizing work of the National Research Laboratories would open the door to many new and important developments.

To bring this about effectively, without question changes in personnel would in due course have to be considered.

The list of laboratories submitted is not by any means complete, but the general principle stated above might be considered as applying all round. To get a final answer as to which ones were suitable to be included in a central scheme would necessitate a careful and intensive study of the actual work going on in the laboratories. . . .

The National Research Council

Since its inception the Research Council has made it a matter of policy to secure coordination of effort not only with the Government departments, but as far as possible to secure the cooperation of all research agencies available in Canada. No large research enterprise has been undertaken without calling together the scientific leaders in the country to secure their judgment—

(1) As to the wisdom of undertaking the special research;

(2) If the research was to be undertaken, as to laying down a scheme of studies in a comprehensive way.

For example before the cereal rust research was undertaken on its present scale, an international conference of experts was called at Winnipeg. . . . The Department of Agriculture undertook to build and staff the Winnipeg Laboratory and to devote their efforts to the study of the sources of infection and possible prevention measures. They also took a part of the plant breeding program for rust resistant varieties. The University of Manitoba undertook a section of the plant breeding work. The University of Saskatchewan undertook a plant breeding program and other scientific aspects of the problem. The University of Alberta

undertook to study the cause of rust infection and the conditions associated with immunity. The National Research Council undertook to finance the work of the three universities in so far as additional equipment and routine help was concerned. A permanent committee of management was appointed to guide the work. This committee meets each year after the work of the year has been concluded to study results and plan new work if necessary.

Tuberculosis was treated in the same way. All the leading bacteriologists in Canada were called in. The mention of the names is a sufficient guarantee of the quality of the work—Klotz and Fitzgerald of Toronto, Meekins of McGill, Nichols of Dalhousie, Reed of Queen's, Rankin of Alberta, Watson and Hilton of the Department of Agriculture, Baudouin of Montreal. This group has been freely cooperating for five years. Not one has been paid for his services—all have taken pleasure in giving assistance.

The Research Council has 29 such committees at work. Leaders in every branch of science have helped gladly because of their desire to help Canada prosper. Five hundred leaders in science serve without remuneration on these committees. The only persons who have given grudging cooperation have been departmental officials, and then never to the extent of discussing their programs.

Attention is called to the fact that the administration of the National Research Laboratories is only one of the many functions of the Council. In the Laboratories, divisions of research are being organized and extended. The Council considers it has a major responsibility in coordinating research efforts and in enlisting the services of all men who can help in the development of Canada. The Council does not desire to take work from any one. It believes however that if it were in a position to bring under review research programmes so as to coordinate them into a systematic effort, it could enormously increase the service which science can render to Canada.

TO J. G. PARMELEE FROM S. P. EAGLESON, OTTAWA, 20 APRIL 1932

In compliance with your request by telephone, I enclose herewith a memorandum regarding economies to be expected through the coordination of Government laboratory services.

In Dr. Tory's absence, this has been prepared by the Directors of the various scientific Divisions of the National Research Council, in the hope that it may be of service.

SUPPLEMENTARY MEMORANDUM REGARDING LABORATORIES

A detailed estimate of the financial saving which could be effected through co-ordination and amalgamation, could only be made following a complete survey of Government laboratories for the purpose of securing authentic information regarding the activities undertaken, operating expenses, equipment, and staff.

The extent of saving would depend in an important degree on the thoroughness with which centralized direction of scientific work was put into effect, and in this connection it would be essential to work out a tentative scheme of centralization and co-ordination in some detail. In the absence of definite information of this nature, only a general estimate of the economy which might be effected can be made.

Attention may be directed to the opinion of the President of the National Research Council given before a Select Special Committee of the House of Commons, namely, that the effectiveness of the work now carried on under the various technical services of the Federal Government could be increased 33% without increased expenditure if these services were effectively co-ordinated.

A reasonable period of time would be required to achieve effectively the suggested co-ordination; the directors are of the opinion that when this has been accomplished, fully one-third present expenditure or an equal amount of work could be done with equivalent reduction of cost, and base their judgement on the following considerations.

A. Direct saving through:

1. The co-ordination of laboratory activities through effective centralized control by increasing efficiency and eliminating unnecessary duplication of effort.
2. The centralization of laboratory facilities where this is feasible, and the elimination of unnecessary duplication of staff, equipment and apparatus.
3. The elimination, at the outset, of unprofitable research projects.
4. A reduction in overhead charges.

B. Indirect saving resulting from increased effectiveness due to:

1. The availability of highly qualified specialists to direct and supervise work, thus ensuring that the work of junior investigators is in promising and effective channels.
2. The availability for consultation of a considerable number of specialists working in related fields of sciences.

3. The availability of extensive library facilities and accessibility to research information.

4. Availability of a wider range of scientific equipment.

5. The more effective use of both staff and equipment than is possible under a system of small scattered laboratories.

6. Greater efficiency in bringing investigations to a final conclusion within a reasonable period of time through the competent direction of the work by senior officers. Projects could be driven forward to an issue more effectively.

7. Elimination of the very real danger of vested interests growing up through the maintenance of unprofitable lines of research.

TO H. M. TORY FROM H. H. STEVENS, OTTAWA, 23 JAN. 1934

A short time ago I called the attention of the Minister of Finance, as Chairman of the Treasury Board, to the fact that further expansion of the Chemistry Branch, Department of Agriculture, was being carried on and suggested that the time had come when the concentration of these activities under the Research Council should be considered.

In reply to these observations Mr. Rhodes has sent me to-day a letter and memorandum, which I enclose.

Will you please look this matter over and discuss it with me in the next day or two.

TREASURY BOARD

Ottawa, 20 January, 1934

SCIENTIFIC AND RESEARCH SERVICES

In reference to Mr. Stevens' letter of the 12th instant concerning the appointment of an Assistant Chemist, the records of the Beatty Commission afford an idea of the extent to which scientific and research services are spread throughout the Government Departments. . . .

There are eighty Chemists employed in the various Departments, exclusive of those in the National Research Council. . . .

The Department of Agriculture alone employs about 180 persons with scientific qualifications, engaged in experimental and research work, with annual salaries of over $400,000.

The Entomological Branch maintains laboratories all over the Dominion for eradication and control of insects, with 70 employees engaged in experimental and research work in these laboratories.

Experimental Farms carry on experimental and research work relating

to all phases of agriculture, and has some 81 employees engaged in experimental and research work.

The Health of Animals Branch has three Pathological Laboratories with 12 employees engaged on research work in connection with live stock diseases.

The Seed Branch maintains a number of seed testing laboratories at which scientific examinations are made of seeds, feeds and fertilizers: 16 analysts are employed.

The above is set out with the idea of showing the extent to which scientific work is carried on by the Department of Agriculture. The list is not complete, nor are all the employees engaged on research work, but a large proportion of them are working along lines which apparently are being duplicated by the National Research Council. . . .

TO H. M. TORY FROM R. NEWTON, OTTAWA, 24 JAN. 1934

I. DUPLICATION OF SERVICES BY DEPARTMENT OF AGRICULTURE AND NATIONAL RESEARCH COUNCIL

The list of activities of the Division of Biology and Agriculture set out in the Treasury Board memorandum accompanying the Hon. Mr. Rhodes' letter to the Hon. Mr. Stevens, dated January 20, 1934, has been drastically revised since the staff of this Division were moved from Edmonton to Ottawa in 1932, on completion of the National Research Laboratory building. However, even before that date there was no duplication of Department of Agriculture activities by the National Research Council staff. The Council's Associate Committees on Grain Research, Field Crop Diseases, Weed Control, Wool, etc., all included representatives of the Department of Agriculture, and the work was carefully planned in concert to avoid duplication.

It is important to remember that many of the staff of the Department of Agriculture are engaged in routine duties connected with the administration of Acts of Parliament, rather than in investigational work. The analysts of the Seed Branch, for example, are almost wholly employed in testing samples for conformity with the Seeds, Feeding Stuffs, Fertilizers, and Agricultural Pests, Acts. The staff of the Division of Biology and Agriculture, on the other hand, includes not a single analyst. They are all men highly trained for the prosecution of special pieces of research.

The guiding principle in the development of the program of the Division of Biology and Agriculture has been to support and amplify the

work of other government departments and research institutions, by doing the things the others were not equipped to do, and especially by carrying investigations into the more fundamental phases.

The best evidence that the officials of other Departments are appreciating the help the National Research Laboratories can give them is the increasing number of requests for such assistance which they are making to us. . . .

II. CONSOLIDATION OF GOVERNMENT LABORATORIES

Co-ordination is an outstanding requirement of government services in agriculture. To what extent this might involve actual consolidation of laboratories can scarcely be suggested without a careful study of the present activities of the various laboratories. Those laboratories which are mainly devoted to research could undoubtedly be brought into close relation with the National Research Council, with benefit to all concerned. On the other hand, those laboratories which are charged with the administration of Acts of Parliament are more remote in their interests. It is not a primary function of the National Research Laboratories to engage in work of a routine or control nature, such as is involved in the administration of these Acts, and if such work should be associated with the Laboratories, it should be placed in a separate division rather than be added to the duties of the research divisions.

There is little doubt, however, that a control laboratory would benefit from a certain measure of technical supervision, which would ensure that the methods employed and the kind and quality of the work done were brought periodically under review. Furthermore, problems sometimes arise in the course of administering an Act which may properly be made a subject of research, as witness the problems recently placed before us by the Seed Branch. Thus an association of these laboratories with the National Research Laboratories, under proper arrangements, might also be of mutual benefit.

The National Research Council has already achieved considerable success as a co-ordinating agency through the medium of its Associate Committees. The membership of a committee normally includes representatives of all the departments and institutions substantially concerned in the particular field of work the committee is set up to promote. One general committee, namely, the Associate Committee on Agriculture, is charged with the duty of surveying the whole field of agriculture for the purpose of appraising the problems in need of research and of securing unified action.

Human nature, of course, sets a limit to what can be accomplished

by such voluntary action. A drastic reorganization and consolidation of services could only be done by a body endowed with the necessary specific authority.

TO H. M. TORY FROM CHARLES CAMSELL, OTTAWA, 10 JAN. 1935

I appreciate very much the cordial terms of your letter of the 3rd instant concerning the use of the library facilities of the Mines Department by your officers. It is at all times a great pleasure to my officers and to me to be able to assist your officers in any way possible and to further the spirit of co-operation which should exist in all departments.

Your courtesy in extending to our staff the facilities of your library is greatly appreciated and I know that my officers will on many occasions be glad to make use of this privilege.

RELATIONS WITH UNIVERSITIES

TO H. M. TORY FROM AUGUSTIN FRIGON (DEAN, ECOLE POLYTECHNIQUE), MONTREAL, 12 JUNE 1931

I must apologize for writing to you again about our graduate, Mr. ——, who is applying for a position under Dr. Whitby.

I have been told a story in which I do not believe at all, about which you should be informed. In some quarters not connected with L'Ecole Polytechnique it appears some people seem to believe that Mr. —— has no chance whatever to obtain a position with the Research Council, because he is a graduate of Ecole Polytechnique. This School would not be recognized by the Authorities of the Council as being capable to qualify men for research work. Its level is supposed to be much lower than that of McGill or Toronto, and therefore, its students are of lower standard. Where that story has started from I do not know, but it is regrettable that it can be accepted as being true by some people.

There is no doubt that we have not gone in for research as much as most of the other Canadian universities. On the other hand we are quite prepared to prove that our undergraduates' work is just as good, and in some branches, even better than that of any other Canadian university. This applies to Mr. ——'s work whom I believe to be perfectly well trained for research work in chemistry. I would not recommend him

for a highly responsible position because he has not had the practice of actual research done on a large scale. I know, however, that in an intermediate position he would be capable of giving full satisfaction. . . .

Under the circumstances, I would be much obliged to you if you would take a personal interest in Mr. ——'s application.

TO AUGUSTIN FRIGON FROM H. M. TORY, OTTAWA, 18 JUNE 1931

I have your letter of June 12th.

May I say that the suggestion that Mr. —— has no chance of appointment here because he is a graduate of the Ecole Polytechnique is entirely without foundation. The Ecole Polytechnique is recognized by the Research Council, as you well know, along with the other scientific institutions in the country, and we are only too glad to secure suitably trained men of French origin for appointment on our staff. As you know, we already have three such men on our staff: Dr. Cambron, Dr. Marion and Dr. Larose.

The real difficulty is that no graduates, whether of McGill, Toronto, or the Ecole Polytechnique, are ready to undertake research work unless they have taken graduate studies and have mastered the methods of research. We have only three men on the whole Chemistry staff at present who hold only the B.Sc. degree, and they are junior assistants receiving salaries of $170 a month. The three men of French origin on our staff all have their Ph.D., Dr. Cambron having had eight years' experience in research, and Dr. Larose and Dr. Marion, each four years. Eleven of the staff of nineteen have their Ph.D. degree, which means a minimum of three years' graduate study and research, after the Bachelor's Degree. Seven others who have positions of medium grade have the M.Sc. degree, two of whom have had eight years' experience in research laboratories following graduation, one seven years, one three years and one two years.

The situation with regard to Mr. —— is complicated by the fact that he appears to have been in a business position receiving a salary of $3900 a year. We have only one man in the total staff of nineteen chemists who is receiving a salary greater than that. If a suitable opening were found and Mr. —— appointed, in justice to the other men on the staff, he could not be appointed at a salary greater than $175 a month, and I am under the impression that he would not consider that attractive. We are certainly prepared to give his case careful consideration for appointment in that grade.

It would seem to us a matter of fundamental importance that Mr. ——, if he intends to become a research man, should attend some university where graduate studies are offered and continue his training.

TO H. M. TORY FROM SIR ARTHUR CURRIE, MONTREAL, 6 JAN. 1932

I hope you have received my letter of December 22nd, with reference to the Institute of Helminthology,* and that you are in accord with the outline as presented in my letter. There was one thing left a little indefinite and that was the approach to the man in Edinburgh, whose name has just slipped my mind.† I was under the impression that you would make that approach. Will you begin the negotiations with him, or shall I?

You will note in my letter that at the last meeting of the Board of Governors of McGill University it was agreed that we were to secure the services of a Director for the Institute. I don't suppose there is any need of our Committee meeting until we have something definite from Edinburgh. I have approached Dr. Todd and find him enthusiastically agreeable. I leave it to you to take the matter up with Newton and Archibald.

By the way, it seems to me that some time ago I had some conversation with you regarding the qualifications of Rowan of Alberta as Professor of Zoology. Do you mind writing me confidentially about him?

TO SIR ARTHUR CURRIE FROM H. M. TORY, OTTAWA, 11 JAN. 1932

. . . The man from Edinburgh of whom we spoke was Dr. Cameron, Lecturer in Helminthology, who worked for eleven years with Leiper in London in connection with tropical medicine, specializing in parasitology. As stated in my letter to you of January 5th, I am expecting any day now to hear from Tallents, and will then place the whole matter in your hands. . . .

With regard to Rowan, I find it a little difficult to write about him because I am afraid that what I have to say will not be of any great help to him in securing an appointment at McGill. . . .

I inquired of J. P. Hill of London about him when in London the year after his appointment and found that he had not succeeded in impressing Hill with a willingness to delve into the heart of a science, but that he

*Helminths are intestinal worms.—M.W.T.

†It is amusing that the name of the incoming Director had "slipped the mind" of Sir Arthur Currie. T. W. M. Cameron was destined to become President of the Royal Society of Canada.—M.W.T.

had made a good impression on Professor Oliver in Botany because of his disposition to do field work. I tried to arrange for him to undertake some work under Hill that would lead him into the field of research, and Hill agreed to the plan. Rowan went over to England one summer to start work, but apparently would not stick to the laboratory but went out again on his various bird missions. After a year or two I had a full discussion of the situation with him. I told him his only hope of becoming a competent zoologist and of proving his right to the headship of a department of the University of Alberta would be by taking up some special line of work and sticking to it until he had proved his position as a zoologist. This he agreed to do. Then to my surprise I found he had made an arrangement with Harvard University to go to Northern Alberta and shoot wild buffalo, and I had to tell him frankly if that was the work he intended to follow he might dismiss from his mind any idea of becoming head of a department in any university over which I presided. He stated in reply he preferred to follow his bent and take second place, and there the matter stood. . . .

When I left Alberta, Rowan was an associate professor with the distinct understanding that so far as I was concerned* he had reached his limit.

I think it would be well to secure further information regarding his work in Alberta before acting on my judgment, as I have now been absent, as you know, nearly four years, and during the last two or three years I was in Alberta I gave little attention to Rowan due to the fact that only elementary work was being done in the department and I knew that was being done well.

*In his reply to Currie's question about Professor Rowan, Tory is scornful of Rowan's disposition to study the habits of birds in the field instead of being a "proper" scientist and sticking to the laboratory. Again with hindsight, it is a pleasure to note that Rowan politely but firmly defied the educational master-figure of his age and proceeded to prove, in his famous studies of the effects of light on birds, that in this matter the grand old man had been hopelessly wrong-headed.

All scientists make mistakes; more active ones make more mistakes. The most frequent mistake is to underrate the capacity of a younger colleague. At this point it is well to remember Tory's faith in Robert Newton.—M.W.T.

Epilogue

"My desire is . . . that mine adversary
had written a book."—Job 31:35

" 'Weaknesses!' exclaimed the astonished Mandarin,
looking around the room as though to discover
in what crevice the unheard-of attributes were
hidden. 'This person's weaknesses? . . . the
bounds set to the admissible from the
taker-down of the spoken word, Ming-shu,
do not in their most elastic moods extend to calumny
and distortion. . . . The one before you
has no weaknesses. . . . Doubtless
before another moon has changed
you will impute to him actual faults!' "—
Ernest Bramah, *Kai Lung's Golden Hours*

"Who-so-ever in writing a moderne Historie,
shall follow truth too neare the heeles,
it may haply strike out his teeth."—
Sir Walter Raleigh, 1614

THIS VOLUME ends with the departure of Dr. H. M. Tory from the National Research Council at the end of May in 1935. One reason for ending here is a failure in the supply of useful private letters after that date; so that any continuation would have a disturbingly different flavour.

Previously published historical books closely concerned with the National Research Council deal with events that took place after 1935. These include Wilfrid Eggleston's book called *Scientists at War*, Captain D. J. Goodspeed's book called *DRB—A History of*

the Defence Research Board of Canada, and Wilfrid Eggleston's book called *Canada's Nuclear Story* on the history of Atomic Energy of Canada Limited. Both DRB and AECL were fathered by the National Research Council and grew out of NRC activities.

The final passages in the present volume consist of a very brief résumé of events from 1935 to the time of writing, in 1965.

Of 107 "permanent" employees of the National Research Council who were on staff in July of 1935, 24 persons were still serving the NRC in 1965:

B. G. Ballard, O.B.E., B.Sc., D.Sc. (Queen's, Assumption, Memorial), D.Eng. (Nova Scotia Tech Col.), F.I.E.E.E., M.E.I.C. (Hon.), F.R.S.C., had become President of the National Research Council;

C. H. Bayley, M.B.E., B.A.Sc., M.A.Sc., M.A. (Toronto), had become head of the textiles group of the Division of Applied Chemistry;

R. C. Burstow had become Administrative Officer to the Division of Applied Physics;

A. E. Chadderton had become Building Superintendent for the Prairie Regional Laboratory;

J. D. Cody had become General Supervisor of Plant Engineering Services;

W. H. Cook, O.B.E., B.Sc., M.Sc. (Alta.), Ph.D. (Stanford), LL.D. (Sask.), D.Sc. (Laval), F.R.S.C., had become Director of the Division of Biosciences;

L. E. Howlett, M.B.E., B.A. (Brit. Col.), M.A. (Toronto), Ph.D. (McGill), F.R.S.C., had become Director of the Division of Applied Physics;

C. Y. Hopkins, B.A., M.A. (Queen's), Ph.D. (New York), had become head of the fats and oils group, Division of Pure Chemistry;

J. W. Hopkins, M.B.E., B.Sc., M.Sc. (Alta.), Ph.D. (London), F.R.S.C., F.A.S.A., I.S.I., A.S.A., had become head of the biometrics group of the Division of Biosciences;

G. J. Klein, M.B.E., B.A.Sc. (Toronto), had become head of the engineering section of the Division of Mechanical Engineering;

M. S. Kuhring, M.B.E., F.R.Ae.S., had become head of the Engine Laboratory of the Division of Mechanical Engineering;

F. A. Lafortune had become a senior technical officer in the colloids group of the Division of Applied Chemistry;

C. G. MacKiddie had become a senior technical officer in the engineering design section of the Radio and Electrical Engineering Division;

Léo Marion, M.B.E., B.Sc., M.Sc. (Queen's), Ph.D. (McGill), D.Sc.

(Laval, Ottawa, Montreal, Queen's, Brit. Col.), LL.D. (Toronto), D. de l'U. (Paris), F.R.S.C., F.R.S., had become Vice-President (Scientific) of the National Research Council;

G. McMorran had become Power Supervisor for the Montreal Road Laboratories;

D. C. Rose, O.B.E., B.Sc., M.Sc. (Queen's), Ph.D. (Cantab.), F.R.S.C., had become Associate Director of the Division of Pure Physics;

C. St. Jacques had become a senior technical officer in the building services section of the Division of Building Research;

R. E. Simmons had become Administrative Assistant to the Division of Administration and Personnel;

N. K. Smith had become Chief of Purchasing Services in the Division of Administration and Personnel;

K. F. Tupper, O.B.E., B.A.Sc. (Toronto), S.M. (Michigan), D.Sc. (Laval, Western Ont.), LL.D. (McMaster), M.E.I.C. (Hon.), had become Vice-President (Scientific) of the National Research Council;

A. S. Tweedie (Miss), B.Sc., M.Sc. (Manitoba), had become a research officer in the textiles group of the Division of Applied Chemistry;

G. O. West had become senior research technician in the mechanics group of the Division of Applied Physics;

V. Wetherup (Miss) had become Translations Editor of the National Science Library;

A. E. Wimperis had become information clerk for the Sussex Drive building.

One man employed on prevailing rates in 1935 was still with the NRC in 1965:

H. V. Dodds had become a foreman-craftsman in the experimental shops of the Division of Mechanical Engineering.

Two persons listed among the 13 "temporary" employees of 1935 were still present in 1965:

E. A. Flood, O.B.E., B.Sc. (Mt. Allison), A.M., Sc.M., Ph.D. (Brown), F.R.S.C., had become head of the group dealing with Thermodynamics of Surface Regions, Structure of Carbons, and Inorganic Chemistry, in the Division of Pure Chemistry;

J. T. Henderson, M.B.E., B.Sc., M.Sc. (McGill), Ph.D. (London), F.R.S.C., F.I.E.E.E., had become head of the electricity group of the Division of Applied Physics.

In 1935, a total of 24 people were employed by the NRC under one or another of its Associate Committees. Of these employees, four were still serving the NRC in 1965:

L. A. BEAULIEU had become a senior technical officer in the Ship Laboratory of the Division of Mechanical Engineering;
P. S. LAMB had become Building Coordinator for the Division of Applied Physics;
G. D. SINCLAIR had become senior research technician in the fibre research group of the Prairie Regional Laboratory;
G. A. YOUNG had become Administrative Assistant to the Division of Applied Chemistry.

The total staff in 1935 was 153 persons. Of these, 31 were still serving the Council in 1965, five of them at the rank of divisional director, or higher.

Of those present in 1935 and no longer present on the staff of the National Research Laboratories in 1965 (in addition to the original four directors, Drs. Boyle, Lathe, Newton, and Whitby), several subsequently rose to the rank of director either within the NRC or elsewhere:

J. ANSEL ANDERSON, B.Sc., M.Sc. (Alta.), Ph.D. (Leeds), D.Sc. (Sask.), became Director-General of the Research Branch of the Canadian Department of Agriculture in 1963.
ADRIEN CAMBRON, O.B.E., B.Sc., M.Sc., Ph.D. (McGill), F.R.S.C., had become Codirector of the Division of Chemistry in 1950 and, in addition, was made Director of the Applied Chemistry Branch. He died in Ottawa after a lengthy illness in 1952.
G. S. FIELD, M.B.E., B.Sc., M.Sc., D.Sc. (Alta.), was appointed Vice-Chairman of the Defence Research Board in 1964.
WILFRED GALLAY, B.A., M.Sc., Ph.D. (McGill), became Director of Research and member of the Board of Directors of the E.B. Eddy Company. He is Vice-President of the Applied Chemistry Division of the International Union of Pure and Applied Chemistry.
N. H. GRACE, M.B.E., B.A. (Sask.), M.A., Ph.D. (McGill), F.R.S.C., became Director of the Research Council of Alberta in 1951. He died in 1961.
JOHN J. GREEN, M.B.E., B.Sc., Ph.D. (London), F.R.Ae.S., F.I.A.S., F.C.A.S.I., became Director of Research Litton Systems (Canada) Limited in 1963.

George C. Lawrence, M.B.E., B.Sc. (Dal.), M.Sc., Ph.D. (Cambridge), became Director of the Reactor Research and Development Division of Atomic Energy of Canada Limited in 1955 and was appointed President of the Atomic Energy Control Board in 1961.

G. A. Ledingham, M.B.E., B.Sc., M.Sc. (Sask.), Ph.D. (Toronto), F.R.S.C., was appointed Director of NRC's Prairie Regional Laboratory in 1947. He died in 1962.

Richard H. F. Manske, B.Sc., M.Sc. (Queen's), Ph.D. (Manchester), D.Sc. (Manchester, McMaster), F.R.S.C., became Director of Research, Dominion Rubber Company Limited in 1943.

J. H. Parkin, C.B.E., B.A.Sc., M.E., LL.D. (Toronto), F.R.Ae.S., F.R.S.C., F.I.Ae.S., had become Director of NRC's Division of Mechanical Engineering in 1936 and, in addition, became Director of the National Aeronautical Establishment in 1951. He retired from the NRC in 1957.

Lloyd M. Pidgeon, M.B.E., B.A. (Man.), B.Sc. (McGill, Oxford), Ph.D. (McGill), became head of the Department of Metallurgical Engineering, University of Toronto, in 1943. He is a director of the Foundation of Canadian Engineering Corporation Limited, and a director and technical adviser of the Dominion Magnesium Company Limited.

Frederick H. Sanders, M.B.E., B.A. (Brit. Col.), A.M., Ph.D. (California), became Superintendent of the Pacific Naval Laboratory in 1959.

Dr. R. W. Boyle, the senior director under Tory, attended a cocktail party on the evening of May 31st, 1935, at which General McNaughton was also present. Boyle never forgave McNaughton for not telling him on that date about his presidency of the NRC, beginning at midnight. This was a particularly bitter pill for Boyle, because McNaughton had been a student under Boyle's tutelage at McGill (1). McNaughton claimed that he did not know about his forthcoming appointment at that time. Boyle did not believe that this was possible and one can hardly blame him for boggling at such strange behaviour in the highest levels of the government. Nevertheless the Order in Council appointing McNaughton President of NRC as from the first of June, 1935, is dated 1 June 1935 (2). Moreover, this order is based on a report by the Minister of Trade and Commerce, also dated 1 June 1935. The evidence is heavily in favour of McNaughton.

At first, the members of Council were not affable towards the man who had so suddenly replaced their hero, Tory. But in a very short time McNaughton had won their respect and their loyalty (1).

The staff of the laboratory were also in a state of shock over the sudden loss of their leader, and were slow to warm to his successor (3). Tory had fought vigorously to maintain a reasonable salary level for the scientific staff against erosion by Stevens, but McNaughton quickly discovered that the salaries of administrators had been allowed to drift into an unreasonable condition. Many of the administrative staff, in 1935, were in far worse state than they would have been under the Civil Service Commission.

McNaughton undertook to do something vigorous about it. Thus Hanson, who had bullied Tory, now found himself being bullied by McNaughton: the General, in effect, told Hanson to jolly well "sign here," and left him no possible alternative, as shown in the following letter:

TO THE HON. R. B. HANSON FROM A. G. L. MCNAUGHTON, OTTAWA, 3 OCT. 1935

I have gone carefully into the question of the necessary reorganization in the Administration Division of the National Research Council, especially with reference to the urgent necessity for reorganization of the Central Registry of the Council, and the provision of a staff to be responsible for the taking of an inventory of equipment and stores. I have found that in addition to certain new positions which are urgently required in order to efficiently carry on the administration work of the Council, a number of employees in the Administration Division have for some time past (some of them for a number of years) been discharging duties which unquestionably entitle them to promotion.

When I had formed a definite conclusion as to the action which should be taken to properly reorganize the Administration Division, I requested the Civil Service Commission to investigate and report as to whether the conclusions which I had reached were justified and in accordance with general practice throughout the Public Service.

I have now received a report from the Organization Branch of the Civil Service Commission on this question and I have the honour to enclose herewith a recommendation to Council on this subject. All of the reclassifications and new positions proposed therein are in accordance with the report received from the Civil Service Commission and all are

considered to be necessary in order that the administrative work of the National Research Council may be effectively discharged.

If the enclosed recommendation meets with your approval, it would be greatly appreciated if you would sign and return it to me at your earliest convenience, so that it may receive consideration by the Governor in Council at the earliest possible date.

In the next four years, McNaughton made the Council ready for the war that he was certain was not far away. When war actually broke, he returned to the military arts, but he left well-chosen scientific nuclei in the hands of his successor, Dr. C. J. Mackenzie.

McNaughton played for Mackenzie the same role that Henry the Eighth played for the first Queen Elizabeth. Henry built the courtly climate—and the navy—that were used to such telling effect by Elizabeth.

Under Mackenzie, the Council entered into the glory of her own Elizabethan age—welding every laboratory in Canada into an effective war instrument by means of the committee mechanism centred on the advisory members of Council, multiplying her own staff and facilities by a factor of ten; and establishing Canada as a scientific world power, worthy of a contributing membership in the exclusive atomic energy club as early as 1942. Mackenzie could never have done these things without the complete confidence, co-operation, and backing of a large number of key men, chief among them a great giant named Clarence Decatur Howe.

An almost equal achievement, also by Mackenzie, was to keep what he had won. It was not easy for the Cabinet to understand that a world-wide scientific explosion had begun, which would require all of Canada's war-time scientific capability, and more. Mackenzie was able to communicate his insight convincingly, and there was no returning to the small ways of an age that had passed. He got rid of nearly all the war research to the newly created Defence Research Board in 1947 (4). But he retained the full strength of NRC personnel built up during the war, and turned them loose on the problems of the peace.

The post-war period bore little resemblance to the peace of the nineteen-thirties. With the pressure of war removed there was a

new feeling of looseness and easiness, an expansion of the spirit. Compared with 1939, everything had expanded, and an NRC ten times larger took up the scientific and technical problems of a very different country, much more heavily industrialized, much more aware of science, much more confident of a well-earned place in the sun.

By 1952, the Council's Atomic Energy Project was ready for independence, and became Atomic Energy of Canada Limited.

In 1952, Dr. E. W. R. Steacie became the fourth President of NRC. His role was to anticipate the needs of the scientific and technical revolution in Canada. The first need was to assure an increasing flow of scientifically educated people: this meant building up the science departments of universities as well as increasing the numbers of scholarships. The second need was to build up laboratories aimed at long-range industrial research. The third need was to encourage Canadian industry, as it matured, to do an increasing amount of research on its own account—as Lord Hailsham puts it: "It is not enough to buy a scientific mind. You must have it yourself if you wish to use it in others" (5).

During Steacie's period in office, the Council's expenditure on university support increased ten-fold, expenditure for operating its own laboratories increased three-fold, and a total of $36 million was expended on additional NRC laboratory facilities. The third evolutionary phase—encouraging industrial research—had just begun at at the time of Dr. Steacie's death in 1962, in which year the NRC budget provided half a million dollars in direct financial support for research performed by Canadian industry.

During this decade the quality of basic and long-range industrial research done in Canada attracted an increasing number of post-graduate fellows from many countries in the world, including Russia.

Steacie was a man who believed passionately in what he did. On one occasion, when the government decided to slash a million dollars off NRC's support for universities, Steacie argued that, at that particular moment in time, this extra support was vitally needed to feed the future; instead, he offered to take the loss on NRC's

own laboratory-building programme and, in fact, this was done. Additional long-range industrial-research buildings were also vital to Canada's future well-being; but Steacie believed that this evolutionary phase came after, and was junior to, the long-range need for more scientists. During his presidency, NRC invested $54 million in university support.

The fifth President of NRC is Dr. B. G. Ballard. In his first report to Parliament, for 1962–63, under the heading "Industrial Research Assistance," Dr. Ballard stated: "For the coming year the government has more than tripled its initial cash commitment, and will consider providing more money if it is needed. It is hoped, therefore, that requests from industry will match this rate of increase. In this way the development of Canada's industrial research facilities, and the resulting economic benefits, will not be delayed."

* * *

The first Chairman, Dr. A. B. Macallum, died in London, Ontario, in 1934, at the age of 76. He had retired from McGill at the age of 70.

The second Chairman, Dr. R. F. Ruttan, died in Montreal, Quebec, in 1930, at the age of 73. He had retired from McGill at the age of 72.

The third Chairman, Dr. R. A. Ross, died in 1936, at the age of 71. He maintained his private practice as a consulting electrical engineer until his death.

The fourth Chairman, Dr. Frank D. Adams, died in Montreal, Quebec, in 1942, at the age of 83. He had retired from McGill at the age of 71.

The fifth Chairman and first President, Dr. H. M. Tory, died in 1947, at the age of 83. He had been retired from the National Research Council at the age of 71. However, he founded Carleton University when he was 79, and was still President of Carleton when he died.

The second President, General A. G. L. McNaughton,* retired from the National Research Council in 1944, at the age of 57. However, he had been on leave of absence from NRC since the

*Died in 1966.

beginning of the war. His term of office as President of NRC turned out to be one incident in a long and vigorous career, which was still continuing in 1965, at which time he had attained the age of 78.

The third President, Dr. C. J. Mackenzie, retired from the Presidency of the National Research Council in 1952, at the age of 63. Like Tory and McNaughton, Mackenzie went on with his career thereafter, and this was still continuing in 1965, at which time Dr. Mackenzie was 77 years old.

The fourth President, Dr. E. W. R. Steacie, died in 1962 at the age of 61. He was the first to die in office.

The fifth President, Dr. B. G. Ballard, was 63 years old in 1965.

Of these nine men, five have been President of the Royal Society of Canada, and three others have been President of the Engineering Institute of Canada. The odd man out, General McNaughton, has other claims to distinction; for instance, he is the only NRC President who later became a member of the Cabinet.

This trickle of Chairmen and Presidents, aided by the flow of eminent men who served as members of the Advisory Council, and the river of carefully chosen laboratory staff, have all of them, to a degree, left a mark upon the institution, and have contributed some nudging to the direction in which it moves. Equally—at the very least, equally—this institution is also the outcome of the genius and foresight of a few gifted statesmen, who shaped it legally in such a way that, while it is by no means foolproof, nevertheless it tends to survive the attentions of those statesmen whose gifts, if any, lie in some other direction.

Many other groups contributed: industrial, university, government departments, and so forth. In the end, so many kinds and conditions of men are involved that the NRC of Canada must be regarded simply as a Canadian social artefact. This volume has dealt with a limited number of men, but of several kinds and conditions. It is obvious that the faults and the virtues of scientific breeds in particular differed from those of other kinds and conditions in degree only, and were perhaps not very widely different, even in degree. The thoroughly documented conclusion is that scientists are probably neither more nor less "human" than anyone else after all. Perhaps this may be better stated in the isomeric form:

the letters quoted in this volume show that, during the years 1915 to 1935, statesmen, government officials, university officials, industrialists, etc. were all just as human as the scientists with whom they corresponded.

Industries have had considerable effects upon the NRC. The Canadian Manufacturers' Association expressed powerful interest and concern as early as 1915. Eminent industrialists serve as members of the Advisory Council. But their most powerful influence lies in their demands for services. Some industries are occasionally impatient in their demands; this happens when they forget their own history; their own development is often a whole war behind that of their opposite numbers in the United States and Great Britain. The immediate prospect is for a sharp increase in Canadian industrial capacity to use research. This service function has always had far-reaching effects upon the structure of the NRC.

Universities have had a great deal to do with the NRC for obvious reasons: they have provided the majority of members to the Advisory Council; they have received most of the extramural support provided so far by the NRC; and they train the entire staff regardless of what path they follow.

The NRC is deeply beholden to various scientific and technical organizations within government departments—especially the departments of Mines and Agriculture—for resisting every attempt to incorporate them wholly within a central body, which would certainly have been disastrous. This insight, so clearly stated by Lord Hailsham in the 1960's, was by no means obvious in the early part of the century. Fortunately, the instinctive resistance of departmental personnel was strong enough to push the NRC back into the path of virtue and towards its proper role.

What is this proper role? It falls into two parts: saying and doing. The advisory function is to give the government the best advice possible on how to spend money on scientific research and development—advice which can then be weighed against all the other factors that the government must consider. The performance function is to do those things that nobody else will do, for various good reasons, but that nevertheless must be done, such as long-range industrial research, with its necessary spicing of basic research.

Certainly the most important function is to enable government to bestow money for research without interfering with "academic" freedom. In this admittedly delicate operation, no device anywhere has been found so effective as an independent advisory council, knowledgeable in the field. Canada's NRC has an excellent record in the field of university support for the physical sciences, and this experience augurs well for the industrial support that has now begun. It is worth noting that the numbers of industrial members of Council have recently been increased, because of this change in emphasis.

While there is nothing "mere" about the granting of money, this is done best against the background of a broader function, to stimulate and encourage research work by others. This the Council has tried to do, not only by its own system of committees but also by way of personnel who serve on committees set up by other institutions.

So far as the "central laboratories" are concerned, their function is: "to fill in gaps, to conduct generalized researches not apt to the functions of narrower institutions, to create organizations and institutions where these are lacking" (5). This the NRC laboratory complex continually tries to do, and in this way it has created, among others, the Defence Research Board, Atomic Energy of Canada Limited, and the Medical Research Council—all arising out of its own evolving fabric. Predictions on the next few institutions likely to arise in this fashion leap to the mind—but in this context are speedily throttled by elementary prudence.

What remains? Surely, it is to be ready, able, and willing to undertake new forms of these two functions, or perhaps entirely new functions, as they emerge from the matrix of time. Already there are those who press forward with demands that sciences other than the physical sciences be considered by NRC; and many other changes are suggested—some in the direction of accelerated evolution, others of a retrograde flavour. The best hope is for changes neither headlong nor ponderous, but matched evenly with the needs of the times, that a supple and vigorous instrument may serve the future of Canada as well as it has served, and helped to mould, the past.

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